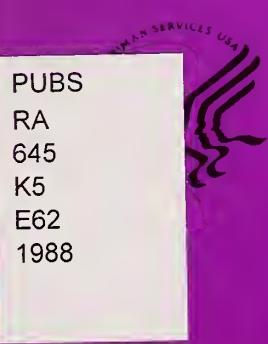


Health Care Financing

Research Report

End Stage Renal Disease, 1988



Department of Health and Human Services
Health Care Financing Administration
Bureau of Data Management and Strategy

Health Care Financing

Research Report

The Health Care Financing Administration (HCFA) was established to combine health care financing and quality assurance within a single agency. HCFA is responsible for the Medicare program, Federal participation in the Medicaid program, and a variety of other health care quality assurance programs.

The mission of HCFA is to promote the timely delivery of appropriate, quality health care to the beneficiaries of its programs—approximately 53 million of the Nation's aged, disabled, and poor. The agency must also ensure that program beneficiaries are aware of the services for which they are eligible, that those services are accessible and of high quality, and that agency policies and actions promote efficiency and quality within the total health care delivery system.

The Bureau of Data Management and Strategy (BDMS) operates HCFA's statistical data systems and maintains the national Medicare statistical files. BDMS also serves as the focal point within the agency for information systems policy, planning, and data standards development.

The Office of Research and Demonstrations (ORD) conducts studies and projects that demonstrate and evaluate optional reimbursement, coverage, eligibility, and management alternatives to the present Federal programs. In addition, ORD examines the impact of HCFA programs on health care status, utilization, and expenditures, as well as their effect on beneficiary access to services, health care providers, and the health care industry.

Health Care Financing Research Reports present the results of major studies and projects conducted by HCFA program staff. These reports contain significant findings that affect HCFA programs and are used as the basis for making program changes.

The *End Stage Renal Disease Research Report, 1988* reflects a wide range of data and analyses regarding the Medicare end stage renal disease program. This report emphasizes trends and comparisons over time, making it a standard reference source for illustrating changes in the nature of the Medicare end stage renal disease population and for examining the pattern of treatment for these patients.

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End Stage Renal Disease, 1988

Department of Health and Human Services
Health Care Financing Administration
Bureau of Data Management and Strategy
Office of Research and Demonstrations
Baltimore, Maryland
September 1990

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End stage renal disease, 1988

Introduction

With the enactment of section 299I of Public Law 92-603 (1972 Amendments to the Social Security Act), full Medicare coverage was extended to persons with end stage renal disease (ESRD), effective July 1, 1973. To be eligible for Medicare benefits, the patient must first be currently or fully insured, or be eligible for Social Security benefits, or be the spouse or dependent child of such a person. Additionally, a physician must certify that the individual requires chronic dialysis or a kidney transplant to maintain life.

The Medicare program pays a prospectively determined amount for kidney transplants and for certain drug treatments and on a composite rate schedule for dialysis services. For example, immunosuppressive drugs prescribed for transplant recipients are covered by Medicare for 1 year following discharge from the hospitalization for the transplant. The drug, epoietin (EPO), used to combat anemia, was added to Medicare coverage effective June 1, 1989.

The Health Care Financing Administration (HCFA) is charged with the effective administration of Medicare benefits to eligible persons with ESRD. Integral to the effective management of the ESRD program is the operation of a comprehensive data base covering medical and demographic information for the Medicare ESRD population. This data base, along with other ESRD program-related data, is contained within the ESRD Program Management and Medical Information System (PMMIS). This system, as required by Public Law 95-292, section (c)(1)(A), is designed to serve the needs of the Department of Health and Human Services in support of program analysis, policy development, and epidemiological research. The ESRD PMMIS includes information both on Medicare ESRD beneficiaries and on Medicare-approved ESRD hospitals and dialysis facilities.

The principal sources of beneficiary-specific information are the Medicare billing records and incidence-specific medical information forms that report onset of ESRD, characteristics and status of a kidney transplant, and cause of death for an ESRD beneficiary. The principal sources of hospital and facility information are the Medicare certification approval notices and an annual survey of these organizations.

Legislation passed in 1986 mandated the establishment of a national ESRD patient registry. This registry, the United States Renal Data System (USRDS), is operated by a Coordinating Center (currently the Urban Institute) under contract with the National Institutes of Health (NIH). The USRDS is managed overall through the cooperative efforts of HCFA and NIH. Further, there are three major advisory committees which are composed of representatives from Federal agencies and professionals from the renal community; these are the Executive Committee, the Scientific Advisory Committee, and the Data Management Advisory Committee. The Department of Health and Human Services is in the process of organizing a steering committee for the USRDS which would assume a policy role and which would ensure many information needs would be met by the USRDS and HCFA without excessively duplicating other Federal systems.

The ESRD PMMIS maintained by HCFA provides the foundation data for the USRDS. However, it is planned that the USRDS will eventually include additional data and that the Coordinating Center will conduct focused studies on the causes, progression, and treatment of ESRD, and will disseminate a variety of reports based on these studies.

HCFA recognizes the need to disseminate the information developed from the ESRD PMMIS data and any resulting analyses of these data as promptly as possible. The purpose of this report is to present, in a single volume, statistics concerning recent trends in ESRD treatment and detailed discussions of selected health issues involving the ESRD population. Several of the tables in this report emphasize trends and comparisons over time, making this report a standard reference on the Medicare ESRD population and on ESRD treatment patterns.

Data which have been released to HCFA from other organizations (e.g., the Department of Veterans Affairs, the Centers for Disease Control, the European Dialysis and Transplantation Association, the Australia and New Zealand Dialysis and Transplant Registry, and the Canadian Renal Failure Register) have been included and identified where appropriate.

Incidence and enrollment

Program incidence

Trends in Medicare ESRD program incidence (that is, the count of new enrollees), from 1982 to 1987 are described in this section. The new Medicare ESRD population is presented by age, sex, race, primary diagnosis, and State in the accompanying tables, along with some comparative data gathered from other Western countries on their ESRD populations.

The total counts of new Medicare ESRD beneficiaries by age, sex, race, and primary diagnosis are shown in Table 1. In 1982, 21,876 persons were added to the Medicare enrollment files as ESRD beneficiaries. By 1987, the annual number of new ESRD beneficiaries had increased to 33,749, representing an average annual increase of 9.1 percent. The incidence from 1986 to 1987 increased by only 7.7 percent, indicating a slowing of growth compared to the 6-year average annual rate of increase of 9.1 percent.

Older persons, in particular those over 65 years of age, comprised the largest and fastest growing age group of ESRD beneficiaries. Specifically, the largest average annual rate of growth was for persons 75 years of age or

over (20.1 percent); also, the increase from 1986 to 1987 was largest for persons 75 years of age or over (11.8 percent). There was a decrease from 1986 to 1987 of 5.3 percent in cases for persons in the 25 to 34 years of age group. This is probably a temporary aberration, since all of the other data in the table reflect annual increases in incidence.

The average annual rate of increase was just .9 percent greater for females (9.6 percent) than for males (8.7 percent). Women comprised 45.6 percent of new enrollees in 1987, up slightly from 44.6 percent in 1982.

Black and white persons, together, made up 95.7 percent of new enrollees in 1987. However, the average annual rates of growth were higher for both Asian persons (11.6 percent) and for American Indians (11.3 percent) than for either white persons (8.4 percent) or black persons (9.8 percent). The highest average annual rate of growth was in the Other/unknown race category (26.3 percent), but this rate is usually reduced over time as more complete information is received on the beneficiaries.

In terms of diagnoses, the average annual rate of growth was highest for those persons whose renal failure was

Table 1
Medicare end stage renal disease program incidence, by age, sex, race, and primary diagnosis: 1982-87

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Percent 1987	Average annual percent change	Percent change 1986-87
Number of new enrollees									
Total	21,876	25,071	26,453	29,290	31,328	33,749	100.0	9.1	7.7
Age									
Under 15 years	415	381	432	415	422	424	1.3	0.4	0.5
15-24 years	1,160	1,100	1,156	1,190	1,178	1,257	3.7	1.6	6.7
25-34 years	2,455	2,460	2,621	2,707	2,960	2,803	8.3	2.7	-5.3
35-44 years	2,606	2,832	3,010	3,374	3,639	3,927	11.6	8.5	7.9
45-54 years	3,530	3,739	3,869	4,217	4,408	4,811	14.3	6.4	9.1
55-64 years	5,286	5,762	6,265	6,889	7,073	7,683	22.8	7.8	8.6
65-74 years	4,608	6,026	6,136	6,990	7,591	8,308	24.6	12.5	9.4
75 years or over	1,816	2,771	2,964	3,508	4,057	4,536	13.4	20.1	11.8
Sex									
Male	12,116	13,804	14,648	15,963	17,199	18,345	54.4	8.7	6.7
Female	9,760	11,267	11,805	13,327	14,129	15,404	45.6	9.6	9.0
Race									
Asian	308	314	382	498	502	534	1.6	11.6	6.4
Black	5,959	7,151	7,445	8,239	8,649	9,517	28.2	9.8	10.0
White	15,233	17,073	18,150	20,023	21,410	22,780	67.5	8.4	6.4
American Indian	194	258	262	270	332	332	1.0	11.3	0.0
Other/unknown	182	275	214	260	435	586	1.7	26.3	34.7
Diagnosis									
Diabetes	5,010	5,900	7,091	8,155	9,207	10,043	29.8	14.9	9.1
Glomerulonephritis	5,111	5,478	5,772	6,186	6,226	6,438	19.1	4.7	3.4
Hypertension	5,389	5,755	6,421	7,287	7,683	8,659	25.7	9.9	12.7
Polycystic kidney disease	1,011	1,056	1,063	1,155	1,197	1,217	3.6	3.8	1.7
Other	2,218	2,591	2,779	3,179	3,167	3,275	9.7	8.1	3.4
Unknown	3,137	4,291	3,327	3,328	3,848	4,117	12.2	5.6	7.0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

Table 2
**Medicare end stage renal disease program incidence rates per million population,
by age, sex, race, and primary diagnosis: 1982-87**

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Average annual percent change	Percent change 1986-87
Number of new enrollees per million population								
Total	94	107	112	123	130	139	8.0	6.7
Age								
Under 15 years	8	7	8	8	8	8	0.1	-0.3
15-24 years	28	27	29	30	30	33	3.3	8.9
25-34 years	62	61	64	64	69	65	0.8	-6.5
35-44 years	93	97	99	106	110	114	4.3	4.0
45-54 years	157	167	172	187	193	207	5.7	7.0
55-64 years	239	259	281	308	318	349	7.9	9.7
65-74 years	284	365	367	411	438	470	10.6	7.4
75 years or over	171	253	264	304	343	373	16.9	8.8
Sex								
Male	107	121	127	137	147	155	7.6	5.6
Female	82	94	97	109	114	123	8.5	8.0
Race								
Asian	83	84	101	131	131	138	10.6	5.4
Black	213	253	261	286	298	324	8.8	9.0
White	77	85	90	98	104	109	7.3	5.4
American Indian	129	170	171	175	213	211	10.3	-0.9
Other/unknown	—	—	—	—	—	—	—	—
Diagnosis								
Diabetes	22	25	30	34	38	41	13.8	8.0
Glomerulonephritis	22	23	24	26	26	26	3.7	2.4
Hypertension	23	25	27	31	32	36	8.9	11.6
Polycystic kidney disease	4	5	4	5	5	5	2.8	0.7
Other	10	11	12	13	13	13	7.1	2.4
Unknown	14	18	14	14	16	17	4.6	6.0

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

attributed to diabetes (14.9 percent) and second highest for those whose renal failure was attributed to hypertension (9.9 percent). These data show that, while the rate of increase for the diagnosis of diabetes appears to be slowing (the annual rate from 1986 to 1987 was only 9.1 percent, compared to the 6-year average rate of 14.9 percent), the rate of increase for the diagnosis of hypertension may be escalating (the annual rate of increase from 1986 to 1987 was 12.7 percent, compared to the 6-year average rate of 9.9 percent). Diabetics and hypertensives also represented the largest proportion of 1987 new enrollees—together representing 55.5 percent of total program additions.

Medicare ESRD program incidence expressed in terms of rates per million population is shown in Table 2. From 1982 to 1987, program incidence increased from 94 enrollees per million persons to 139 enrollees per million persons, representing an average annual rate of increase of 8.0 percent. Incidence rates are strongly related to age, ranging from 8 enrollees per million persons in the under 15 years of age group to 470 enrollees per million persons in the 65 to 74 years of age group. Males had a higher incidence rate (155 enrollees per million) than did females

(123 enrollees per million). Black persons had the highest incidence rate (324 enrollees per million), followed by American Indians (211 enrollees per million), Asian persons (138 enrollees per million), and white persons (109 enrollees per million).

Medicare ESRD program incidence per million population is shown by State in Table 3. Overall, as shown in Table 2, incidence rates are increasing. This is generally the case for individual States as well. Of the 50 States and the District of Columbia, all had higher program incidence rates in 1987 than in 1982. In 1982, 9 States and the District of Columbia had incidence rates greater than 100 enrollees per million persons. In contrast, 37 States and the District of Columbia had incidence rates greater than 100 enrollees per million persons in 1987. The District of Columbia continues to carry an incidence rate greater than 200 enrollees per million persons.

Variations by State in Medicare ESRD program incidence are illustrated again in Table 4, with adjustments for age, sex, and race. State incidence rates per million are averaged across the 6 years from 1982 to 1987 to make the estimates more stable, and the States are ranked from highest to lowest incidence rates.

Table 3

Medicare end stage renal disease program Incidence rates per million population, by State: 1982-87

State	1982	1983	1984	1985	1986	1987
Number of new enrollees per million population						
United States	94	107	112	123	130	139
Alabama	103	132	125	132	137	152
Alaska	27	37	32	25	70	50
Arizona	97	121	112	125	141	133
Arkansas	75	101	110	108	115	145
California	98	113	113	122	136	139
Colorado	56	59	69	75	95	94
Connecticut	93	119	110	145	136	148
Delaware	117	84	104	145	137	157
District of Columbia	273	272	259	313	258	275
Florida	117	133	140	149	165	180
Georgia	109	131	129	132	149	163
Hawaii	102	107	118	173	157	186
Idaho	61	61	67	81	84	80
Illinois	96	108	112	128	137	147
Indiana	82	97	95	108	107	125
Iowa	70	82	77	93	107	96
Kansas	85	75	86	92	99	108
Kentucky	72	75	87	102	107	112
Louisiana	96	109	124	134	154	164
Maine	55	66	92	82	84	94
Maryland	101	106	125	129	125	150
Massachusetts	85	95	101	96	103	97
Michigan	88	99	114	116	126	132
Minnesota	70	77	87	95	99	116
Mississippi	93	125	122	130	137	146
Missouri	89	90	107	116	127	139
Montana	52	74	84	80	81	75
Nebraska	64	68	72	92	93	106
Nevada	83	113	96	120	144	128
New Hampshire	69	70	77	80	79	98
New Jersey	119	141	127	152	162	169
New Mexico	91	99	99	107	107	105
New York	99	110	115	121	130	130
North Carolina	97	109	113	140	137	154
North Dakota	64	60	76	76	100	92
Ohio	89	98	105	116	124	132
Oklahoma	75	76	88	93	105	115
Oregon	64	83	80	94	105	111
Pennsylvania	96	108	125	138	144	144
Rhode Island	79	108	117	130	103	113
South Carolina	113	126	136	163	164	171
South Dakota	76	79	91	97	92	127
Tennessee	86	108	95	112	115	136
Texas	96	107	105	118	124	138
Utah	50	64	93	69	80	81
Vermont	69	69	68	75	68	91
Virginia	107	131	134	155	126	141
Washington	61	74	80	89	91	94
West Virginia	78	95	111	102	119	129
Wisconsin	81	76	89	89	99	116
Wyoming	53	47	53	69	45	73

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87; and U.S. Department of Commerce, Bureau of the Census: Population Estimates and Projections. *Current Population Reports*. Series P-25, No. 998. Washington. U.S. Government Printing Office.

Table 4
Average Medicare end stage renal disease program incidence rates
per million population, by State: 1982-87

State	Unadjusted		Age, sex, race, adjusted	
	Rate	Rank	Rate	Rank
Number of new enrollees per million population				
Alabama	130	9	112	23
Alaska	41	51	51	51
Arizona	122	16	127	7
Arkansas	109	25	101	37
California	121	18	110	25
Colorado	75	45	91	47
Connecticut	125	12	134	3
Delaware	124	14	125	10
District of Columbia	275	1	134	2
Florida	148	2	127	6
Georgia	136	6	125	11
Hawaii	141	5	78	49
Idaho	72	49	94	45
Illinois	121	17	119	15
Indiana	102	29	117	17
Iowa	87	39	104	34
Kansas	91	36	100	39
Kentucky	93	33	105	33
Louisiana	130	8	115	19
Maine	79	42	97	40
Maryland	123	15	113	21
Massachusetts	96	31	107	28
Michigan	113	22	119	13
Minnesota	91	37	112	24
Mississippi	126	11	100	38
Missouri	112	23	113	22
Montana	74	46	90	48
Nebraska	83	40	96	41
Nevada	115	21	129	4
New Hampshire	79	43	101	36
New Jersey	145	4	138	1
New Mexico	101	30	103	35
New York	118	19	106	31
North Carolina	125	13	114	20
North Dakota	78	44	95	44
Ohio	110	24	118	16
Oklahoma	92	35	93	46
Oregon	90	38	106	32
Pennsylvania	126	10	126	9
Rhode Island	108	27	119	14
South Carolina	146	3	128	5
South Dakota	94	32	106	30
Tennessee	109	26	107	29
Texas	115	20	116	18
Utah	73	48	109	26
Vermont	73	47	95	42
Virginia	133	7	127	8
Washington	82	41	95	43
West Virginia	106	28	121	12
Wisconsin	92	34	109	27
Wyoming	56	50	78	50

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

Information on the unadjusted rates is shown in the first two columns and rates as adjusted for age, sex, and race are shown in the last two columns (adjusted with the indirect method). During this period (1982 to 1987), the U.S. average unadjusted incidence rate was 116 enrollees per million (calculated from Table 3). The individual average unadjusted rates ranged from a high of 275 enrollees per million in the District of Columbia to a low of 41 enrollees per million in Alaska. In general, the age-sex-race adjustment did not greatly alter the ranking of the States. However, it did narrow the range of incidence rates per million. After adjustment, the individual rates ranged from a high of 138 enrollees per million in New Jersey to a low of 51 enrollees per million in Alaska. The District of Columbia, where black persons comprise 70 percent of the total population, had an adjusted incidence rate of

134 enrollees per million, which is 51.3 percent lower than its unadjusted rate. Conversely, Utah, where the black population is less than 1 percent of the total, had an adjusted rate of 109 enrollees per million, which is 49.3 percent higher than its unadjusted rate of 73 enrollees per million.

Incidence rates per million population for the years from 1982 to 1987, for a number of countries that have ESRD registries, including the U.S., are presented in Table 5. These rates represent not only a difference in underlying renal failure but in medical and economic environments in the various countries as well. In 1987, the incidence rates per million persons for countries other than the United States ranged from the low of 16 per million in Poland to the high of 85 per million in the Federal Republic of Germany. However, Poland had the highest

Table 5
New end stage renal disease patients per million population, for selected countries: 1982-87

Country	1982	1983	1984	1985	1986	1987	Average annual percent increase	Percent change 1986-87
Number of patients per million								
Austria	41	54	62	57	70	77	13.4	10.0
Belgium	48	61	70	62	74	76	9.6	2.7
Bulgaria	23	28	20	33	33	38	10.6	15.2
Czechoslovakia	20	21	21	23	27	29	7.7	7.4
Denmark	32	40	40	43	56	48	8.4	-14.3
Federal Republic of Germany	52	56	67	59	66	85	10.3	28.8
Finland	34	46	35	45	41	47	6.7	14.6
France	41	44	49	43	44	58	7.2	31.8
German Democratic Republic	26	28	33	32	35	38	7.9	8.6
Greece	29	41	47	58	54	58	14.9	7.4
Hungary	12	12	14	19	16	21	11.8	31.3
Iceland	35	5	50	0	37	57	10.2	54.1
Ireland	21	24	28	48	33	36	11.4	9.1
Israel	62	67	75	59	58	70	2.5	20.7
Italy	43	46	48	47	49	49	2.6	0.0
Luxembourg	45	73	38	52	85	66	8.0	-22.4
Netherlands	32	46	34	49	48	44	6.6	-8.3
Norway	39	54	53	36	59	43	2.0	-27.1
Poland	7	8	11	10	13	16	18.0	23.1
Portugal	28	41	43	49	50	49	11.8	-2.0
Spain	42	61	59	45	51	50	3.5	-2.0
Sweden	53	61	60	62	60	56	1.1	-6.7
Switzerland	49	55	47	59	65	62	4.8	-4.6
United Kingdom	31	33	34	43	47	51	10.5	8.5
Yugoslavia	21	32	36	32	36	39	13.2	8.3
Australia	37	38	45	39	44	48	5.3	9.1
New Zealand	33	30	34	37	43	44	5.9	2.3
Canada	51	53	58	61	67	71	6.8	6.0
United States ¹	94	107	112	123	130	139	8.0	6.7
White	77	85	90	98	104	109	7.3	5.4
Black	213	253	261	286	298	324	8.8	9.0
Asian	83	84	101	131	131	138	10.6	5.4
Indian	129	170	171	175	213	211	10.3	-0.9

¹ Includes only Medicare entitled end stage renal disease (ESRD) patients. Of all ESRD patients in the United States, it is estimated that 7 to 10 percent are not Medicare eligible.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87; European Dialysis and Transplant Association (EDTA) Combined Report on Regular Dialysis and Transplantation in Europe, 1981-86; Canadian Renal Failure Register, 1986; Tenth Report on the Australia and New Zealand Dialysis and Transplant Registry, July 1987.

Table 6
Medicare end stage renal disease enrollment, by dialysis and functioning graft: 1978-87

Year	Patients on dialysis		Patients with a functioning graft		All patients	
	Number	Percent	Number	Percent	Number	Percent
1978	39,133	88.5	5,074	11.5	44,207	100.0
1979	45,904	87.8	6,354	12.2	52,258	100.0
1980	52,517	87.3	7,618	12.7	60,135	100.0
1981	58,668	86.8	8,903	13.2	67,571	100.0
1982	65,597	85.8	10,815	14.2	76,412	100.0
1983	73,438	85.0	12,984	15.0	86,422	100.0
1984	79,629	83.4	15,897	16.6	95,526	100.0
1985	85,472	81.6	19,288	18.4	104,760	100.0
1986	90,841	79.5	23,465	20.5	114,306	100.0
1987	97,111	78.2	27,086	21.8	124,197	100.0
Average annual percent increase	10.6	—	20.5	—	12.2	—
1986-87 percent increase	6.9	—	15.4	—	8.7	—

NOTES: Enrollment is as of December 31 of each year and includes Medicare patients who are alive and currently entitled. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1978-87.

Table 7
Medicare end stage renal disease program enrollment for dialysis patients, by age, sex, race, and primary diagnosis: 1982-87

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Percent 1987	Average annual percent increase	Percent change 1986-87
								Number of patients	
Total	65,597	73,438	79,629	85,472	90,841	97,111	100.0	8.2	6.9
Age									
Under 15 years	606	685	694	669	685	696	0.7	2.8	1.6
15-24 years	2,738	2,742	2,812	2,797	2,712	2,794	2.9	0.4	3.0
25-34 years	6,866	7,227	7,491	7,753	7,972	8,157	8.4	3.5	2.3
35-44 years	8,565	9,617	10,299	10,993	11,682	12,421	12.8	7.7	6.3
45-54 years	11,827	12,591	13,379	13,935	14,404	15,095	15.5	5.0	4.8
55-64 years	16,840	18,375	19,756	21,031	21,828	23,037	23.7	6.5	5.5
65-74 years	13,633	16,162	18,024	19,859	21,868	23,761	24.5	11.8	8.7
75 years or over	4,522	6,039	7,174	8,435	9,690	11,150	11.5	19.8	15.1
Sex									
Male	35,487	39,505	42,697	45,413	47,790	50,727	52.2	7.4	6.1
Female	30,110	33,933	36,932	40,059	43,051	46,384	47.8	9.0	7.7
Race									
Asian	422	608	775	983	1,161	1,307	1.3	25.4	12.6
Black	20,091	23,043	25,602	28,071	30,348	33,039	34.0	10.5	8.9
White	42,327	46,974	50,465	53,650	56,418	59,605	61.4	7.1	5.6
American Indian	281	453	605	697	806	902	0.9	26.3	11.9
Other/unknown	2,476	2,360	2,182	2,071	2,108	2,258	2.3	—	—
Diagnosis									
Diabetes	7,943	10,171	12,754	15,149	17,557	20,018	20.6	20.3	14.0
Glomerulonephritis	12,116	14,544	16,567	18,461	19,731	20,886	21.5	11.5	5.9
Hypertension	11,536	14,111	16,400	18,715	20,868	23,146	23.8	14.9	10.9
Polycystic kidney disease	3,453	3,890	4,202	4,478	4,650	4,802	4.9	6.8	3.3
Other	5,855	6,682	7,472	8,290	8,835	9,388	9.7	9.9	6.3
Unknown	24,694	24,040	22,234	20,379	19,200	18,871	19.4	-5.2	-1.7

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

average annual percent increase for this 6-year period of 18.0 percent. All of the countries shown in Table 5 experienced increases in the incidence of treated renal disease between 1982 and 1987. Eleven of the countries experienced growth rates in excess of 10 percent per year. However, in 1987, incidence of renal failure in the U.S. (as reported under Medicare) was more than 80 percent higher than all but one of the other countries—the Federal Republic of Germany. The U.S. was 63 percent higher than that country.

Program enrollment

Trends in Medicare ESRD program total enrollment for the years 1982 to 1987 are described in this section. Tables are presented that show Medicare ESRD enrollment by age, sex, race, and primary diagnosis. Enrollment is broken into two groups of persons: those on dialysis and those with a functioning graft. Enrollment counts are taken as of December 31 of each year and reflect the patients' dialysis or transplant status as of that date.¹

Medicare enrollment by dialysis and functioning graft patient groups for the years 1978 to 1987 is presented in Table 6. During this time, enrollment grew from 44,207 to 123,197—an average annual rate of increase of 12.2 percent. The number of persons on dialysis grew at a slower rate of 10.6 percent per year (from 39,133 in 1978 to 97,111 in 1987). From 1986 to 1987, the rate of growth was only 6.9 percent for the patients on dialysis. The number of patients with a functioning kidney graft increased at an annual rate of 20.5 percent (from 5,074 in 1978 to 27,086 in 1987). The reasons for the rapid growth in patients with a functioning graft are increases in the number of transplants performed and increased graft survival rates. As a result of these transplantation trends, patients with a functioning graft increased from 11.5 percent of the total Medicare ESRD population in 1978 to 21.8 percent in 1987.

Medicare dialysis patient population by age, sex, race, and primary diagnosis for the years 1982 to 1987 is shown in Table 7. Growth rate in the dialysis patient population has been greatest for persons 75 years of age or over, primarily as a result of the increase in program incidence rates shown in Tables 1 and 2. In 1982, persons 75 years of age or over accounted for 6.9 percent of the total dialysis patient population, increasing to 11.5 percent in 1987. The largest populations in absolute numbers are those in the two age groups between 55 and 74 years of age. Together these two groups account for 48.2 percent of the total dialysis patient population.

In 1987, 52.2 percent of the Medicare dialysis population were male and 61.4 percent were white persons. The major diagnoses reported as primary causes of renal failure were hypertension (23.8 percent),

glomerulonephritis (21.5 percent), and diabetes (20.6 percent).

Medicare dialysis patient population expressed as enrollment per million population is shown in Table 8. Overall, dialysis patient enrollment increased from 283 per million population in 1982 to 399 per million in 1987—an average annual increase of 7.1 percent. Dialysis enrollment rates vary markedly with age, ranging from 13 per million for persons under 15 years of age to 1,345 per million for persons 65 to 74 years of age. Males have an enrollment rate per million that is 15.4 percent greater than females (428 per million and 371 per million, respectively). Dialysis patient enrollment for black persons is 2.9 times as great as for white persons (1,126 per million and 286 per million, respectively). Enrollment rates among Asian persons and American Indians may be underestimated because of underreporting in earlier years.

The Medicare ESRD population with a functioning graft is presented in Table 9 by age, sex, race, and primary diagnosis for the years 1982 to 1987. The same population in terms of rates per million population is shown in Table 10. In contrast to the dialysis population, those persons with a functioning graft come largely from the younger age groups. Of persons with a functioning graft in 1982 and 1987, 90.9 percent and 85.1 percent, respectively, were under 55 years of age. The percentage of persons 55 years of age or older is increasing. In 1982, this group represented only 9.1 percent of the total persons with functioning grafts; by 1987, this group represented 14.9 percent of this total. Also, the percent increase from 1982 to 1987 was greater for each of the three older age groups than for any of the other age groups. Taken together, the 55 years of age or older group increased at an annual rate of 32.7 percent from 1982 to 1987; the under 55 years of age group increased by only 18.6 percent over the same period.

In 1987, 62.8 percent of the Medicare ESRD population with a functioning kidney graft were male and 78.3 percent were white persons. The major diagnoses reported as the primary cause for renal failure were glomerulonephritis (31.5 percent) and diabetes (17.2 percent).

In terms of rates per million population (Table 10), the ESRD functioning graft population has increased from 47 per million in 1982 to 111 per million in 1987—a 19.0 percent annual increase. In 1987, those persons 34 to 44 years of age and 45 to 54 years of age had the highest rates per million population (222 per million and 241 per million, respectively). The rate was higher for males (143 per million) than for females (70 per million). The rate per million population was highest for black persons (167 per million) followed by American Indians (153 per million), Asian persons (122 per million), and white persons (102 per million).

¹ Before 1984, there were problems of underreporting of kidney transplants. Consequently, some people who have a functioning graft will be misclassified as on dialysis. Therefore, the data will tend to overestimate the number of persons on dialysis and underestimate the number of people with functioning grafts.

Table 8
**Medicare end stage renal disease program dialysis enrollment per million population,
 by age, sex, race, and primary diagnosis: 1982-87**

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Average annual percent change	Percent change 1986-87
Number of enrollees per million								
Total	283	313	337	358	377	399	7.1	5.9
Age								
Under 15 years	12	13	13	13	13	13	2.4	0.9
15-24 years	66	67	70	71	70	73	2.0	5.1
25-34 years	174	179	182	184	186	188	1.6	1.1
35-44 years	305	328	337	346	353	362	3.5	2.5
45-54 years	526	561	595	617	631	649	4.3	2.7
55-64 years	762	826	885	942	982	1,046	6.6	6.6
65-74 years	842	980	1,077	1,167	1,262	1,345	9.8	6.6
75 years or over	425	552	639	731	819	916	16.6	11.9
Sex								
Male	315	347	371	391	407	428	6.3	5.1
Female	253	282	304	327	348	371	8.0	6.8
Race								
Asian	114	163	206	259	302	337	24.2	11.5
Black	718	816	898	975	1,044	1,126	9.4	7.8
White	213	234	249	262	273	286	6.1	4.6
American Indian	187	299	396	452	517	574	25.1	10.9
Other/unknown	—	—	—	—	—	—	—	—
Diagnosis								
Diabetes	34	43	54	63	73	82	19.2	12.9
Glomerulonephritis	52	62	70	77	82	86	10.4	4.8
Hypertension	50	60	69	78	87	95	13.8	9.9
Polycystic kidney disease	15	17	18	19	19	20	5.8	2.3
Other	25	29	32	35	37	39	8.9	5.2
Unknown	106	103	94	85	80	78	-6.1	-2.7

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

Table 9
**Medicare end stage renal disease program enrollment for patients with functioning grafts,
by age, sex, race, and primary diagnosis: 1982-87**

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Percent 1987	Average annual percent change	Percent increase 1986-87
								Number of patients	
Total	10,815	12,984	15,897	19,288	23,465	27,086	100.0	20.2	15.4
Age									
Under 15 years	370	438	534	652	733	801	3.0	16.7	9.3
15-24 years	1,481	1,679	1,843	2,079	2,336	2,438	9.0	10.5	4.4
25-34 years	3,214	3,804	4,555	5,218	6,097	6,580	24.3	15.4	7.9
35-44 years	2,770	3,385	4,262	5,346	6,569	7,599	28.1	22.4	15.7
45-54 years	1,995	2,406	2,979	3,702	4,613	5,621	20.8	23.0	21.9
55-64 years	871	1,122	1,515	1,972	2,637	3,316	12.2	30.7	25.7
65-74 years	111	147	202	306	460	699	2.6	44.5	52.0
75 years or over	3	3	7	13	20	32	0.1	60.5	60.0
Sex									
Male	6,803	8,176	10,020	12,175	14,825	17,007	62.8	20.1	14.7
Female	4,012	4,808	5,877	7,113	8,640	10,079	37.2	20.2	16.7
Race									
Asian	62	130	201	261	371	473	1.7	50.1	27.5
Black	1,830	2,274	2,845	3,548	4,284	4,890	18.1	21.7	14.1
White	8,461	10,140	12,459	15,059	18,352	21,209	78.3	20.2	15.6
American Indian	114	134	134	170	199	241	0.9	16.2	21.1
Other/unknown	348	306	258	250	259	273	1.0	—	—
Diagnosis									
Diabetes	1,121	1,564	2,125	2,902	3,846	4,648	17.2	32.9	20.9
Glomerulonephritis	2,913	3,735	4,845	6,001	7,329	8,521	31.5	23.9	16.3
Hypertension	856	1,168	1,512	1,956	2,482	2,956	10.9	28.1	19.1
Polycystic kidney disease	424	578	832	1,051	1,378	1,721	6.4	32.3	24.9
Other	986	1,293	1,714	2,200	2,715	3,079	11.4	25.6	13.4
Unknown	4,515	4,646	4,869	5,178	5,715	6,161	22.7	6.4	7.8

NOTES: All calculations are based on unrounded numbers. Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

Table 10
Medicare end stage renal disease program enrollment per million population for patients with functioning grafts, by age, sex, race, and primary diagnosis: 1982-87

Age, sex, race, and primary diagnosis	1982	1983	1984	1985	1986	1987	Average annual percent increase	Percent increase 1986-87
Number of patients per million								
Total	47	55	67	81	97	111	19.0	14.3
Age								
Under 15 years	7	8	10	13	14	15	16.3	8.5
15-24 years	36	41	46	53	60	64	12.3	6.5
25-34 years	81	94	110	124	143	152	13.3	6.6
35-44 years	99	116	140	168	199	222	17.5	11.5
45-54 years	89	107	132	164	202	241	22.2	19.4
55-64 years	39	50	68	88	119	151	30.8	27.0
65-74 years	7	9	12	18	27	40	42.0	49.1
75 years or over	0	0	1	1	2	3	56.3	55.6
Sex								
Male	60	72	87	105	126	143	18.9	13.6
Female	34	40	48	58	70	81	19.1	15.6
Race								
Asian	17	35	53	69	97	122	48.7	26.3
Black	65	81	100	123	147	167	20.6	13.1
White	43	50	61	74	89	102	19.0	14.5
American Indian	76	89	88	110	128	153	15.0	20.0
Other/unknown	—	—	—	—	—	—	—	—
Diagnosis								
Diabetes	5	7	9	12	16	19	31.6	19.7
Glomerulonephritis	13	16	20	25	30	35	22.8	15.2
Hypertension	4	5	6	8	10	12	26.9	18.0
Polycystic kidney disease	2	2	4	4	6	7	31.1	23.7
Other	4	6	7	9	11	13	24.4	12.3
Unknown	19	20	21	22	24	25	5.4	6.8

NOTES: All calculations are based on unrounded numbers. Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1982-87.

Patient treatment trends

Dialysis patients

The statistics in this section are taken from the ESRD Facility Survey, Form HCFA-2744. The facility survey covers all patients receiving services at Medicare-approved dialysis facilities and transplant centers. All figures shown are as of December 31 for each year. Because they include both Medicare entitled and non-Medicare patients, these numbers are not comparable to those for the Medicare ESRD population presented in other sections of this report. Also, because only Medicare-approved facilities are surveyed, the numbers do not represent the entire U.S. ESRD population. These caveats must be kept in mind when using Tables 11 through 15.

Data on the ESRD dialysis population, by type and place of dialysis for the years 1983 through 1988, are shown in Table 11. During these years the total number of dialysis patients, for the facilities reporting, increased from 71,987 in 1983 to 105,958 in 1988, or an average annual growth rate of 8.0 percent. Please note that, for Table 11, comparisons of the various categories of patients in dialysis exclude those in training to learn to self-dialyze. This is because these patients may ultimately select any one of the available modalities and they may elect to dialyze in-unit or at home; however, this information is not complete enough to categorize them at the time of the survey.

By far, the most common dialysis modality is in-unit (categorized as "outpatient" in Table 11) hemodialysis. Patients receiving dialysis in this modality increased from 57,029 in 1983 (79.2 percent of all dialysis patients) to 86,250 in 1988 (81.4 percent of all dialysis patients). Further, in 1988, the hemodialysis modality accounted for 99.6 percent of those patients dialyzing in-unit. The remaining .4 percent of in-unit patients were using peritoneal dialysis.

There were 18,763 patients dialyzing at home in 1988, which was 17.7 percent of all dialysis patients. This represents a net decrease from 1983 when there were 13,645 home patients, representing 19.0 percent of all dialysis patients.

Within the home dialysis population, continuous ambulatory peritoneal dialysis (CAPD) was consistently the most frequently selected modality for dialysis. There were 13,318 patients in this group in 1988, compared to 5,445 for all other at-home modalities. However, with the exception of the increase of 158 patients into the home peritoneal category in 1988, continuous cycling peritoneal dialysis (CCPD) was the fastest growing treatment, compared to both in-unit and other home patient categories. The average annual rate of increase for CCPD from 1984 to 1988 was 22.3 percent; the annual rate of

increase from 1987 to 1988 was 12.5 percent. The annual rate of increase for the exception group, home peritoneal patients, from 1987 to 1988 was 94.0 percent. The home peritoneal modality has historically been the least frequently selected modality. Consequently, it is likely that 1988 was an atypical year for the selection of home peritoneal dialysis.

A comparison of the data for all in-unit patients to all home patients shows that the use of in-unit services grew at the faster rate. From 1983 to 1988, the average annual percent change for the combined in-unit modalities was 8.4 percent; for the combined home dialysis modalities, the average annual percent change from 1983 to 1988 was 6.6 percent.

The number of persons completing self-dialysis training is shown in Table 12. The annual increase in the number of people completing training was 10.2 percent from 1987 to 1988, just over 1 percentage point higher than the 6 year average annual rate of change of 9.0 percent.

Transplant patients

Data for kidney transplants, by Medicare and non-Medicare categories, are shown in Table 13. During the years 1980 through 1986, the number of persons receiving a kidney transplant increased from 4,676 to 8,948, an average increase of 11.4 percent per year. However, from 1986 to 1988 there was a slight drop in patients receiving a transplant (8,948 to 8,909, respectively). The overall rate of increase in transplanted patients from 1980 through 1988 was 8.4 percent per year. The rate of increase was similar for Medicare-covered transplants (8.5 percent per year) and non-Medicare-covered transplants (7.6 percent per year). In 1988, 91.8 percent of all kidney transplants were Medicare-covered.

Kidney transplants by donor type are shown in Table 14. The overall trends are very similar to those in Table 13. The number of kidney transplants is slightly higher than the number of transplanted patients because a few patients receive more than one transplant during a calendar year. Cadaver donor transplants increased at a faster rate than did living related donor transplants during the 1980 through 1988 period (9.6 percent and 4.1 percent annual rates of increase, respectively). In 1980, cadaver donor transplants accounted for 72.9 percent of all kidney transplants. By 1988, this had risen to 79.7 percent. Beginning in 1988, living donor transplants were reported as living related and living unrelated. Thus, some of the 7.7 percent decrease in living related donor transplants between 1987 and 1988 is a reporting artifact. There were 56 unrelated living donor transplants in 1988, 0.6 percent of all kidney transplants.

Table 11
End stage renal disease dialysis population, by type and place of dialysis: 1983-88¹

Type and place of dialysis	1983	1984	1985	1986	1987	1988	Average annual percent change	Percent change 1987-88
Number of patients								
Total	71,987	78,483	84,797	90,886	98,432	105,958	8.0	7.6
Outpatient hemodialysis	57,029	62,174	67,241	72,756	79,352	86,250	8.6	8.7
Outpatient peritoneal	745	590	584	510	440	365	-13.3	-17.0
Home hemodialysis	4,323	4,125	3,983	3,675	3,582	3,197	-5.9	-10.7
Home peritoneal ²	790	259	231	191	168	326	-16.2	94.0
CAPD ³	8,532	9,995	11,236	11,913	12,825	13,318	9.3	3.8
CCPD ⁴	—	859	953	1,307	1,708	1,922	22.3	12.5
Self training	568	481	569	534	357	580	-0.4	62.5

¹ Counts are as of December 31 of each year from the End Stage Renal Disease Facility Surveys.

² This figure decreased significantly in 1984, partially because the CCPD patients were counted in this category in previous years. A CCPD category was added to the ESRD Facility Survey in 1984.

³ Continuous ambulatory peritoneal dialysis.

⁴ Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 12
Dialysis patients completing training, by type of dialysis: 1983-88

Type of dialysis	1983	1984	1985	1986	1987	1988	Average annual percent change	Percent change 1987-88
Number of patients								
Total completed dialysis training ¹	6,782	7,586	8,548	8,706	9,477	10,445	9.0	10.2
Hemodialysis	1,140	1,086	1,047	874	823	983	2.9	19.4
Peritoneal ²	581	247	165	141	212	191	-19.9	-9.9
CAPD ³	5,061	5,691	6,584	6,723	7,184	7,882	9.3	9.7
CCPD ⁴	—	562	752	968	1,258	1,389	25.4	10.4

¹ Includes a small percentage of hemodialysis and peritoneal dialysis patients who completed training during the year for self-care outpatient dialysis.

² This figure decreased significantly in 1984, partially because CCPD patients were counted in this category in previous years. A CCPD category was added to the ESRD Facility Survey in 1984.

³ Continuous ambulatory peritoneal dialysis.

⁴ Continuous cycling peritoneal dialysis.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 13
Kidney transplant patients, by Medicare coverage: 1983-88

Year	Total		Medicare coverage			
	Number	Percent change	Medicare		Non-Medicare	
			Number	Percent change	Number	Percent change
1980	4,676	—	4,266	—	410	—
1981	4,898	4.7	4,440	4.1	458	11.7
1982	5,252	7.2	4,846	9.1	406	-11.4
1983	6,098	16.1	5,591	15.4	507	24.9
1984	6,933	13.7	6,304	12.8	629	24.1
1985	7,676	10.7	7,073	12.2	603	-4.1
1986	8,948	16.6	8,258	16.8	690	14.4
1987	8,949	0.0	8,298	0.5	651	-5.7
1988	8,909	-0.4	8,175	-1.5	734	12.7
Average annual percent change						
1980-88	—	8.4	—	8.5	—	7.6

NOTE: Average annual percent change calculated by use of compounding.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 14
Kidney transplants, by donor type: 1983-88

Year	Total		Donor type			
	Number	Percent change	Cadaver		Living-related	
			Number	Percent change	Number	Percent change
1980	4,704	—	3,427	—	1,277	—
1981	4,905	4.3	3,445	0.5	1,460	14.3
1982	5,358	9.2	3,681	6.9	1,677	14.9
1983	6,112	14.1	4,328	17.6	1,784	6.4
1984	6,968	14.0	5,264	21.6	1,704	-4.5
1985	7,695	10.4	5,819	10.5	1,876	10.1
1986	8,976	16.6	7,089	21.8	1,887	0.6
1987	8,967	-0.1	7,060	-0.4	1,907	1.1
1988	8,932	-0.4	7,116	0.8	1,760	-7.7
Average annual percent change						
1980-88	—	8.3	—	9.6	—	4.1

¹The living-unrelated category was added to the End Stage Renal Disease Facility Survey in 1988.

NOTE: Average annual percent change calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 15
Patients awaiting transplants: 1983-88

Year	Number of patients	Percent increase	Percent of dialysis population
1983	7,176	6.2	10.0
1984	8,562	19.9	10.9
1985	9,791	14.4	11.5
1986	11,108	13.5	12.2
1987	12,140	9.3	12.3
1988	13,282	9.4	12.5
Average annual percent increase			
1983-88	—	13.1	—

NOTE: Average annual percent increase calculated by use of compounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

End stage renal disease facility survey data

The information presented in Tables 16 through 29 was collected through the use of Form HCFA-2744, ESRD Facility Survey, and covers the period of January 1, 1988 through December 31, 1988.

It is important to note that the number of facilities surveyed and reporting, as summarized in Tables 16 through 29, does not equal the total number of Medicare-approved providers of renal care as reported in Tables 46, 47, and 48. Some Medicare-approved hospitals are not surveyed because they provide acute dialysis only or they serve as a backup to a chronic dialysis facility; i.e., they do not provide routine maintenance dialysis for ESRD patients. Other Medicare-approved renal providers were not requested to complete an ESRD Facility Survey because they were so recently certified that there was insufficient time to include them in the survey population. Consequently, the renal facilities counts reported in Tables

16 through 29 are not directly comparable to the provider counts in Tables 46, 47, and 48.

It must also be noted that this report includes only Medicare-approved renal providers and, thus, this section does not reflect all renal dialysis facilities in the country. There are a number of facilities providing chronic dialysis services (such as several Department of Veterans Affairs and Department of Defense facilities), that are not Medicare-approved and are not included in this Report. Therefore, due to slight differences in reporting facilities and some imprecision in determining Medicare dialysis status, the survey data will not agree with the PMMIS enrollment data shown in Tables 6 through 10.

The survey tables (Tables 16 through 29) are arrayed either nationally or by State. Tables 19 through 22 provide aggregate dialysis patient population figures as of December 31, 1988 (end of the survey period). The other tables reflect activity for the entire survey period, unless otherwise noted. Tables 17, 18, 25, and 27 display patients by Medicare status—currently enrolled in Medicare, Medicare application pending, and non-Medicare. Patients appearing in the non-Medicare category may include those who are covered by the Veterans Administration, those who are covered by private insurance (including those who have employer group health insurance coverage for the first year of ESRD, with Medicare becoming the primary insurer after the first year), those who are covered by Medicaid, and foreign nationals.

In the 1988 facility survey we found that, as of December 31, 1988, 86.7 percent of all ESRD patients were entitled to Medicare benefits; 6.0 percent had applications for Medicare entitlement pending; and 7.3 percent were not eligible for Medicare. (See Tables 17 and 25.)

We estimate that approximately 200 home hemodialysis patients are not included in the facility survey counts. This is due to idiosyncratic reporting of new health care delivery entities.

The rate of compliance of surveyed facilities in completing the ESRD Facility Survey was 99.9 percent for 1988.

Table 16
End stage renal disease facilities surveyed and reporting, by State: 1988

State	Dialysis facility		Transplant center	
	Surveyed	Reporting	Surveyed	Reporting
Total	1,758	1,757	208	208
Alabama	35	35	2	2
Alaska	2	2	0	0
Arizona	35	35	4	4
Arkansas	26	26	3	3
California	200	200	21	21
Colorado	15	15	3	3
Connecticut	17	17	2	2
Delaware	4	4	0	0
District of Columbia	18	18	5	5
Florida	121	121	4	4
Georgia	66	66	5	5
Hawaii	11	11	1	1
Idaho	6	6	0	0
Illinois	71	71	8	8
Indiana	30	30	2	2
Iowa	13	13	4	4
Kansas	12	12	2	2
Kentucky	20	20	3	3
Louisiana	62	62	6	6
Maine	5	5	1	1
Maryland	41	41	3	3
Massachusetts	30	30	9	9
Michigan	42	42	9	9
Minnesota	24	24	4	4
Mississippi	25	25	1	1
Missouri	41	41	9	9
Montana	5	5	0	0
Nebraska	8	8	3	3
Nevada	5	5	0	0
New Hampshire	5	5	0	0
New Jersey	31	31	3	3
New Mexico	15	15	2	2
New York	111	111	14	14
North Carolina	45	45	5	5
North Dakota	7	7	1	1
Ohio	46	46	12	12
Oklahoma	27	27	6	6
Oregon	11	11	1	1
Pennsylvania	86	86	10	10
Puerto Rico	17	17	1	1
Rhode Island	6	6	0	0
South Carolina	42	42	1	1
South Dakota	9	9	0	0
Tennessee	48	47	4	4
Texas	127	127	16	16
Utah	12	12	3	3
Vermont	1	1	1	1
Virgin Islands	2	2	1	1
Virginia	54	54	3	3
Washington	19	19	5	5
West Virginia	14	14	2	2
Wisconsin	29	29	3	3
Wyoming	1	1	0	0
American Samoa	1	1	0	0
Guam	1	1	0	0
Mariana Islands	1	1	0	0

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 17
Dialysis patient eligibility status, by State: 1988

State	Facilities reporting	Total dialysis patients	Eligibility status		
			Currently enrolled in Medicare	Medicare application pending	Non-Medicare
Total	1,757	105,958	91,820	6,371	7,767
Alabama	35	2,309	2,061	93	155
Alaska	2	53	51	1	1
Arizona	35	1,502	1,173	100	229
Arkansas	26	972	882	43	47
California	200	11,927	9,862	761	1,304
Colorado	15	902	780	76	46
Connecticut	17	1,318	1,159	99	60
Delaware	4	337	262	44	31
District of Columbia	18	943	725	54	164
Florida	121	5,649	4,981	355	313
Georgia	66	3,307	2,964	145	198
Hawaii	11	639	571	38	30
Idaho	6	197	180	6	11
Illinois	71	4,786	4,027	351	408
Indiana	30	2,159	1,955	124	80
Iowa	13	769	711	26	32
Kansas	12	720	671	35	14
Kentucky	20	1,157	890	131	136
Louisiana	62	2,493	2,187	137	169
Maine	5	271	255	9	7
Maryland	41	2,215	1,866	143	206
Massachusetts	30	2,220	1,892	185	143
Michigan	42	3,501	3,010	185	306
Minnesota	24	1,282	1,147	64	71
Mississippi	25	1,634	1,511	60	63
Missouri	41	2,127	1,926	102	99
Montana	5	231	202	13	16
Nebraska	8	472	447	19	6
Nevada	5	412	369	27	16
New Hampshire	5	249	205	26	18
New Jersey	31	3,984	3,474	218	292
New Mexico	15	624	496	37	91
New York	111	9,260	7,694	623	943
North Carolina	45	3,126	2,794	159	173
North Dakota	7	201	178	17	6
Ohio	46	3,909	3,265	398	246
Oklahoma	27	923	843	57	23
Oregon	11	776	706	46	24
Pennsylvania	86	5,615	5,012	308	295
Puerto Rico	17	1,451	1,276	42	133
Rhode Island	6	473	447	12	14
South Carolina	42	1,988	1,788	90	110
South Dakota	9	166	154	8	4
Tennessee	47	2,329	2,108	100	121
Texas	127	7,340	6,433	425	482
Utah	12	370	327	33	10
Vermont	1	98	91	6	1
Virgin Islands	2	42	39	1	2
Virginia	54	3,025	2,640	133	252
Washington	19	1,456	1,308	91	57
West Virginia	14	625	557	33	35
Wisconsin	29	1,314	1,189	71	54
Wyoming	1	26	25	0	1
American Samoa	1	16	14	1	1
Guam	1	48	28	8	12
Mariana Islands	1	20	12	2	6

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 18
Dialysis patient counts, by place of dialysis: United States, 1988

Patient count	Total	Percent	Place of dialysis			
			Outpatient	Percent	Home	
Dialysis patients beginning survey	98,181	—	80,161	81.65	18,020	18.35
Additions	63,769	—	54,896	86.09	8,873	13.91
New starts	40,390	63.34	34,206	62.31	6,184	69.69
Restarted	669	1.05	580	1.06	89	1.00
Transferred in	20,247	31.75	18,036	32.85	2,211	24.92
Returned after transplant	2,463	3.86	2,074	3.78	389	4.38
Losses	55,992	—	47,570	84.96	8,422	15.04
Deaths	24,860	44.40	21,042	44.23	3,818	45.33
Recovered functions	1,365	2.44	1,183	2.49	182	2.16
Transplanted	7,579	13.54	5,762	12.11	1,817	21.57
Transferred out	20,608	36.81	18,203	38.27	2,405	28.56
Discontinued dialysis	1,248	2.23	1,105	2.32	143	1.70
Lost to followup	332	0.59	275	0.58	57	0.68
Number needed to balance ¹	0	—	-292	—	292	—
Dialysis patients end of survey	105,958	—	87,195	82.29	18,763	17.71
Hemodialysis	89,714	84.67	86,517	99.22	3,197	17.04
IPD ²	698	0.66	372	0.43	326	1.74
CAPD ³	13,564	12.80	246 ¹	0.28	13,318	70.98
CCPD ⁴	1,982	1.87	60 ¹	0.07	1,922	10.24
Medicare status	105,958	—	—	—	—	—
Medicare	91,820	86.66	—	—	—	—
Medicare pending	6,371	6.01	—	—	—	—
Non-Medicare	7,767	7.33	—	—	—	—

¹Accurate counts are not always available because of the movement of home patients, self-care training, and in-unit backup dialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 19
Patients receiving care outpatient, by State: December 31, 1988

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Total	1,757	87,195	86,250	365	267	7	246	60
Alabama	35	1,955	1,953	0	1	0	1	0
Alaska	2	48	48	0	0	0	0	0
Arizona	35	1,196	1,180	0	8	0	7	1
Arkansas	26	758	748	7	2	0	0	1
California	200	10,628	10,583	1	24	0	15	5
Colorado	15	657	654	0	1	0	2	0
Connecticut	17	1,036	1,025	0	0	0	11	0
Delaware	4	263	261	0	2	0	0	0
District of Columbia	18	850	849	0	1	0	0	0
Florida	121	4,909	4,895	0	4	1	9	0
Georgia	66	2,776	2,746	17	0	0	13	0
Hawaii	11	575	574	0	1	0	0	0
Idaho	6	168	166	0	2	0	0	0
Illinois	71	4,167	4,069	27	63	0	8	0
Indiana	30	1,457	1,451	0	0	0	6	0

See footnotes at end of table.

Table 19—Continued
Patients receiving care outpatient, by State: December 31, 1988

State	Facilities reporting	Total outpatients	Outpatient dialysis		Self-dialysis training			
			Hemo ¹	IPD ²	Hemo ¹	IPD ²	CAPD ³	CCPD ⁴
Iowa	13	543	531	0	4	0	4	4
Kansas	12	489	483	1	1	0	4	0
Kentucky	20	886	880	4	2	0	0	0
Louisiana	62	2,215	2,212	0	1	0	2	0
Maine	5	217	217	0	0	0	0	0
Maryland	41	1,905	1,899	3	1	0	2	0
Massachusetts	30	1,788	1,779	2	4	0	3	0
Michigan	42	2,538	2,475	37	6	1	19	0
Minnesota	24	1,035	1,033	2	0	0	0	0
Mississippi	25	1,270	1,259	3	7	0	1	0
Missouri	41	1,588	1,571	3	8	0	5	1
Montana	5	126	123	1	2	0	0	0
Nebraska	8	247	240	1	0	0	1	5
Nevada	5	300	283	1	9	0	7	0
New Hampshire	5	194	193	0	1	0	0	0
New Jersey	31	3,120	3,047	58	6	0	6	3
New Mexico	15	526	509	0	0	0	16	1
New York	111	7,689	7,568	82	22	0	16	1
North Carolina	45	2,488	2,412	0	3	3	42	28
North Dakota	7	172	172	0	0	0	0	0
Ohio	46	3,161	3,137	12	1	0	10	1
Oklahoma	27	670	659	6	0	1	4	0
Oregon	11	461	459	0	0	0	1	1
Pennsylvania	86	4,696	4,667	17	2	0	7	3
Puerto Rico	17	1,332	1,308	20	0	0	4	0
Rhode Island	6	412	412	0	0	0	0	0
South Carolina	42	1,812	1,771	0	37	0	4	0
South Dakota	9	150	150	0	0	0	0	0
Tennessee	47	1,850	1,841	0	6	0	3	0
Texas	127	6,389	6,322	44	13	0	6	4
Utah	12	283	283	0	0	0	0	0
Vermont	1	58	52	0	6	0	0	0
Virgin Islands	2	42	42	0	0	0	0	0
Virginia	54	2,590	2,579	1	7	1	2	0
Washington	19	966	956	0	9	0	0	1
West Virginia	14	482	470	7	0	0	5	0
Wisconsin	29	957	949	8	0	0	0	0
Wyoming	1	21	21	0	0	0	0	0
American Samoa	1	16	16	0	0	0	0	0
Guam	1	48	48	0	0	0	0	0
Mariana Islands	1	20	20	0	0	0	0	0

¹Hemodialysis.

²Intermittent peritoneal dialysis.

³Continuous ambulatory peritoneal dialysis.

⁴Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 20
Patients receiving care at home, by State: December 31, 1988

State	Facilities reporting	Total home patients	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	1,757	18,763	3,197	326	13,318	1,922
Alabama	35	354	53	36	206	59
Alaska	2	5	5	0	0	0
Arizona	35	306	16	11	231	48
Arkansas	26	214	34	12	154	14
California	200	1,299	104	2	996	197
Colorado	15	245	60	6	156	23
Connecticut	17	282	16	0	242	24
Delaware	4	74	5	0	68	1
District of Columbia	18	93	2	0	71	20
Florida	121	740	80	0	507	153
Georgia	66	531	65	2	412	52
Hawaii	11	64	13	0	38	13
Idaho	6	29	8	0	15	6
Illinois	71	619	124	5	438	52
Indiana	30	702	113	0	572	17
Iowa	13	226	56	0	137	33
Kansas	12	231	43	0	186	2
Kentucky	20	271	26	8	226	11
Louisiana	62	278	28	0	215	35
Maine	5	54	7	0	35	12
Maryland	41	310	27	3	244	36
Massachusetts	30	432	72	0	270	90
Michigan	42	963	67	16	830	50
Minnesota	24	247	119	0	118	10
Mississippi	25	364	182	0	176	6
Missouri	41	539	68	27	398	46
Montana	5	105	36	0	66	3
Nebraska	8	225	7	2	204	12
Nevada	5	112	32	0	72	8
New Hampshire	5	55	4	0	46	5
New Jersey	31	864	138	6	619	101
New Mexico	15	98	1	0	90	7
New York	111	1,571	356	2	1,087	126
North Carolina	45	638	82	8	452	96
North Dakota	7	29	1	0	28	0
Ohio	46	748	44	0	624	80
Oklahoma	27	253	16	95	120	22
Oregon	11	315	59	0	238	18
Pennsylvania	86	919	114	6	669	130
Puerto Rico	17	119	41	0	75	3
Rhode Island	6	61	3	1	56	1
South Carolina	42	176	30	0	138	8
South Dakota	9	16	0	0	8	8
Tennessee	47	479	123	36	290	30
Texas	127	951	136	13	649	153
Utah	12	87	38	1	42	6
Vermont	1	40	13	0	27	0
Virgin Islands	2	0	0	0	0	0
Virginia	54	435	72	1	313	49
Washington	19	490	370	26	85	9
West Virginia	14	143	15	1	115	12
Wisconsin	29	357	73	0	259	25
Wyoming	1	5	0	0	5	0
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 21
Dialysis treatment setting of end stage renal disease patients, by State: 1988

State	Facilities reporting	Total dialysis patients	Dialyzed outpatient		Dialyzed at home	
			Total	Percent	Total	Percent
Total	1,757	105,958	87,195	82.3	18,763	17.7
Alabama	35	2,309	1,955	84.7	354	15.3
Alaska	2	53	48	90.6	5	9.4
Arizona	35	1,502	1,196	79.6	306	20.4
Arkansas	26	972	758	78.0	214	22.0
California	200	11,927	10,628	89.1	1,299	10.9
Colorado	15	902	657	72.8	245	27.2
Connecticut	17	1,318	1,036	78.6	282	21.4
Delaware	4	337	263	78.0	74	22.0
District of Columbia	18	943	850	90.1	93	9.9
Florida	121	5,649	4,909	86.9	740	13.1
Georgia	66	3,307	2,776	83.9	531	16.1
Hawaii	11	639	575	90.0	64	10.0
Idaho	6	197	168	85.3	29	14.7
Illinois	71	4,786	4,167	87.1	619	12.9
Indiana	30	2,159	1,457	67.5	702	32.5
Iowa	13	769	543	70.6	226	29.4
Kansas	12	720	489	67.9	231	32.1
Kentucky	20	1,157	886	76.6	271	23.4
Louisiana	62	2,493	2,215	88.8	278	11.2
Maine	5	271	217	80.1	54	19.9
Maryland	41	2,215	1,905	86.0	310	14.0
Massachusetts	30	2,220	1,788	80.5	432	19.5
Michigan	42	3,501	2,538	72.5	963	27.5
Minnesota	24	1,282	1,035	80.7	247	19.3
Mississippi	25	1,634	1,270	77.7	364	22.3
Missouri	41	2,127	1,588	74.7	539	25.3
Montana	5	231	126	54.5	105	45.5
Nebraska	8	472	247	52.3	225	47.7
Nevada	5	412	300	72.8	112	27.2
New Hampshire	5	249	194	77.9	55	22.1
New Jersey	31	3,984	3,120	78.3	864	21.7
New Mexico	15	624	526	84.3	98	15.7
New York	111	9,260	7,689	83.0	1,571	17.0
North Carolina	45	3,126	2,488	79.6	638	20.4
North Dakota	7	201	172	85.6	29	14.4
Ohio	46	3,909	3,161	80.9	748	19.1
Oklahoma	27	923	670	72.6	253	27.4
Oregon	11	776	461	59.4	315	40.6
Pennsylvania	86	5,615	4,696	83.6	919	16.4
Puerto Rico	17	1,451	1,332	91.8	119	8.2
Rhode Island	6	473	412	87.1	61	12.9
South Carolina	42	1,988	1,812	91.1	176	8.9
South Dakota	9	166	150	90.4	16	9.6
Tennessee	47	2,329	1,850	79.4	479	20.6
Texas	127	7,340	6,389	87.0	951	13.0
Utah	12	370	283	76.5	87	23.5
Vermont	1	98	58	59.2	40	40.8
Virgin Islands	2	42	42	100.0	0	0.0
Virginia	54	3,025	2,590	85.6	435	14.4
Washington	19	1,456	966	66.3	490	33.7
West Virginia	14	625	482	77.1	143	22.9
Wisconsin	29	1,314	957	72.8	357	27.2
Wyoming	1	26	21	80.8	5	19.2
American Samoa	1	16	16	100.0	0	0.0
Guam	1	48	48	100.0	0	0.0
Mariana Islands	1	20	20	100.0	0	0.0

NOTE: Percents may not add to total because of rounding.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 22
Patients completing a self-dialysis training course during the calendar year, by State: 1988

State	Facilities reporting	Total patients	Hemo-dialysis	IPD ¹	CAPD ²	CCPD ³
Total	836	10,445	983	191	7,882	1,389
Alabama	16	167	11	0	99	57
Alaska	1	1	1	0	0	0
Arizona	17	227	30	6	143	48
Arkansas	11	104	7	10	74	13
California	86	962	46	0	811	105
Colorado	10	117	16	3	78	20
Connecticut	13	134	4	0	110	20
Delaware	1	74	4	0	69	1
District of Columbia	7	65	3	0	50	12
Florida	53	400	10	0	298	92
Georgia	26	315	7	3	269	36
Hawaii	2	34	7	0	23	4
Idaho	2	15	4	0	7	4
Illinois	30	364	30	0	299	35
Indiana	20	309	25	0	279	5
Iowa	10	114	16	0	66	32
Kansas	6	100	9	15	73	3
Kentucky	9	108	7	6	93	2
Louisiana	15	173	10	0	135	28
Maine	3	22	4	0	7	11
Maryland	18	170	12	6	133	19
Massachusetts	21	248	30	0	162	56
Michigan	30	568	35	19	471	43
Minnesota	5	112	36	0	69	7
Mississippi	9	137	37	0	96	4
Missouri	21	308	28	17	247	16
Montana	4	47	11	0	33	3
Nebraska	3	93	1	2	76	14
Nevada	3	76	16	0	47	13
New Hampshire	3	18	0	0	18	0
New Jersey	21	483	22	7	380	74
New Mexico	8	71	0	0	65	6
New York	62	742	92	1	556	93
North Carolina	15	383	15	9	269	90
North Dakota	4	17	1	0	14	2
Ohio	28	448	11	4	386	47
Oklahoma	10	175	4	32	124	15
Oregon	8	168	35	1	118	14
Pennsylvania	55	550	50	3	391	106
Puerto Rico	5	68	12	0	52	4
Rhode Island	3	50	1	1	46	2
South Carolina	10	119	53	0	62	4
South Dakota	1	15	0	0	6	9
Tennessee	15	170	31	11	102	26
Texas	63	629	28	5	485	111
Utah	8	43	4	1	34	4
Vermont	1	10	2	0	8	0
Virgin Islands	0	0	0	0	0	0
Virginia	26	239	24	0	176	39
Washington	10	198	124	15	49	10
West Virginia	9	101	6	1	82	12
Wisconsin	18	180	11	13	138	18
Wyoming	1	4	0	0	4	0
American Samoa	0	0	0	0	0	0
Guam	0	0	0	0	0	0
Mariana Islands	0	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 23
Outpatient dialysis treatments given during the calendar year, by State: 1988

State	Facilities reporting	Total ¹ treatments	Hemodialysis	IPD ²
Total	1,757	11,923,406	11,820,109	103,297
Alabama	35	270,256	266,663	3,593
Alaska	2	6,514	6,514	0
Arizona	35	158,122	158,122	0
Arkansas	26	102,901	102,024	877
California	200	1,458,387	1,456,242	2,145
Colorado	15	93,739	93,718	21
Connecticut	17	147,345	146,925	420
Delaware	4	34,659	34,659	0
District of Columbia	18	116,154	115,922	232
Florida	121	679,741	679,741	0
Georgia	66	385,045	371,291	13,754
Hawaii	11	80,580	80,580	0
Idaho	6	21,974	21,974	0
Illinois	71	563,730	548,275	15,455
Indiana	30	187,320	187,247	73
Iowa	13	70,505	70,505	0
Kansas	12	66,413	66,367	46
Kentucky	20	123,345	122,735	610
Louisiana	62	300,345	300,168	177
Maine	5	33,782	33,782	0
Maryland	41	256,020	255,247	773
Massachusetts	30	255,877	255,201	676
Michigan	42	350,961	345,632	5,329
Minnesota	24	141,466	140,967	499
Mississippi	25	173,633	173,026	607
Missouri	41	222,705	219,359	3,346
Montana	5	13,526	13,438	88
Nebraska	8	31,171	30,863	308
Nevada	5	40,042	40,031	11
New Hampshire	5	26,306	26,306	0
New Jersey	31	414,727	407,410	7,317
New Mexico	15	75,549	75,541	8
New York	111	1,052,685	1,034,754	17,931
North Carolina	45	336,081	336,081	0
North Dakota	7	21,464	21,464	0
Ohio	46	413,717	412,231	1,486
Oklahoma	27	92,176	90,805	1,371
Oregon	11	63,424	63,297	127
Pennsylvania	86	635,744	628,824	6,920
Puerto Rico	17	183,109	182,051	1,058
Rhode Island	6	57,885	57,885	0
South Carolina	42	240,014	240,014	0
South Dakota	9	19,718	19,718	0
Tennessee	47	250,638	249,347	1,291
Texas	127	892,882	879,375	13,507
Utah	12	38,835	38,833	2
Vermont	1	7,162	7,162	0
Virgin Islands	2	5,089	5,089	0
Virginia	54	359,618	359,190	428
Washington	19	139,403	139,130	273
West Virginia	14	68,280	67,596	684
Wisconsin	29	128,775	126,921	1,854
Wyoming	1	3,185	3,185	0
American Samoa	1	2,525	2,525	0
Guam	1	5,711	5,711	0
Mariana Islands	1	2,446	2,446	0

¹Does not include training treatments.

²Intermittent peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 24
Dialysis training treatments given during the calendar year, by State: 1988

State	Facilities reporting	Total training treatments	Hemodialysis	IPD ¹	CAPD ²	CCPD ³
Total	1,757	140,842	46,003	1,450	79,570	13,819
Alabama	35	1,766	290	0	1,025	451
Alaska	2	18	18	0	0	0
Arizona	35	2,607	1,249	58	1,052	248
Arkansas	26	1,380	580	77	642	81
California	200	12,127	2,167	0	6,918	3,042
Colorado	15	1,435	483	21	791	140
Connecticut	17	3,193	108	0	2,846	239
Delaware	4	418	137	0	274	7
District of Columbia	18	697	30	0	587	80
Florida	121	2,950	189	0	2,217	544
Georgia	66	2,372	132	10	2,009	221
Hawaii	11	335	87	0	209	39
Idaho	6	131	94	0	22	15
Illinois	71	3,363	554	0	2,550	259
Indiana	30	3,036	578	0	2,417	41
Iowa	13	1,724	505	0	971	248
Kansas	12	6,988	1,194	0	5,732	62
Kentucky	20	972	258	27	640	47
Louisiana	62	1,261	199	0	819	243
Maine	5	193	39	0	98	56
Maryland	41	1,798	276	28	1,239	255
Massachusetts	30	2,385	594	23	1,285	483
Michigan	42	5,361	879	116	4,077	289
Minnesota	24	1,093	407	0	595	91
Mississippi	25	2,843	2,096	0	711	36
Missouri	41	2,965	945	125	1,704	191
Montana	5	561	249	0	300	12
Nebraska	8	869	27	18	728	96
Nevada	5	1,870	1,065	0	608	197
New Hampshire	5	333	33	0	294	6
New Jersey	31	5,415	1,252	28	3,223	912
New Mexico	15	538	0	0	493	45
New York	111	11,941	4,700	86	6,402	753
North Carolina	45	3,909	538	124	2,510	737
North Dakota	7	171	4	0	145	22
Ohio	46	4,468	319	20	3,693	436
Oklahoma	27	1,368	39	202	1,029	98
Oregon	11	1,521	457	0	963	101
Pennsylvania	86	4,922	991	39	3,106	786
Puerto Rico	17	2,466	1,819	0	539	108
Rhode Island	6	372	38	5	306	23
South Carolina	42	16,930	11,394	0	5,506	30
South Dakota	9	88	0	0	30	58
Tennessee	47	2,270	686	172	1,196	216
Texas	127	5,843	1,355	59	3,359	1,070
Utah	12	396	60	3	281	52
Vermont	1	109	75	0	34	0
Virgin Islands	2	0	0	0	0	0
Virginia	54	2,476	909	0	1,196	371
Washington	19	6,323	5,516	80	656	71
West Virginia	14	834	216	5	549	64
Wisconsin	29	1,410	173	124	966	147
Wyoming	1	28	0	0	28	0
American Samoa	1	0	0	0	0	0
Guam	1	0	0	0	0	0
Mariana Islands	1	0	0	0	0	0

¹Intermittent peritoneal dialysis.

²Continuous ambulatory peritoneal dialysis.

³Continuous cycling peritoneal dialysis.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 25
Kidney transplant activity during the calendar year:
United States, 1988

Category	Number
Transplants performed at center	8,932
Living-related donor	1,761
Living-unrelated donor	56
Cadaveric donor	7,115
Patients awaiting transplant	13,282
Dialysis	12,563
Nondialysis	719
Patients who received transplant at center	8,909
Medicare status	8,909
Medicare	7,584
Medicare pending	591
Non-Medicare	
U.S. resident	501
Other	23

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 26
Disposition of cadaveric kidneys, by source: United States, 1988

Source	Total	Disposition of cadaveric kidneys			
		Transplanted at center	Sent to another center	Sent to foreign center	Nonviable kidneys
Total	9,582	7,178	2,069	20	315
Harvested at center	2,156	1,051	983	4	118
Obtained from other transplant hospital	744	647	92	0	5
Obtained from independent organ procurement organization	3,978	3,753	180	6	39
Obtained from nontransplant hospital	2,704	1,727	814	10	153
Nonviable kidneys	315	—	—	—	—
Used for research	85	—	—	—	—
Discarded	230	—	—	—	—

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 27
Kidney transplant center patient eligibility status, by State: 1988

State	Centers reporting	Total transplant patients	Currently enrolled in Medicare	Medicare application pending	Non-Medicare	
					U.S. resident	Other
Total	208	8,909	7,584	591	501	233
Alabama	2	218	202	9	5	2
Arizona	4	142	103	14	11	14
Arkansas	3	36	33	2	1	0
California	21	1,189	945	86	70	88
Colorado	3	133	127	4	2	0
Connecticut	2	102	85	7	10	0
District of Columbia	5	189	156	2	6	25
Florida	4	397	359	8	23	7
Georgia	5	271	226	41	4	0
Hawaii	1	16	14	0	1	1
Illinois	8	351	315	17	13	6
Indiana	2	146	140	0	6	0
Iowa	4	92	86	6	0	0
Kansas	2	48	45	3	0	0
Kentucky	3	93	74	7	11	1
Louisiana	6	132	125	1	3	3
Maine	1	35	21	0	0	14
Maryland	3	106	104	0	2	0
Massachusetts	9	308	204	62	28	14
Michigan	9	295	267	22	4	2
Minnesota	4	292	232	30	30	0
Mississippi	1	21	21	0	0	0
Missouri	9	248	239	3	4	2
Nebraska	3	64	53	10	1	0
New Jersey	3	90	87	2	1	0
New Mexico	2	65	65	0	0	0
New York	14	529	439	21	62	7
North Carolina	5	190	178	11	1	0
North Dakota	1	1	0	0	1	0
Ohio	12	496	421	48	10	17
Oklahoma	6	118	97	18	3	0
Oregon	1	121	116	3	2	0
Pennsylvania	10	677	500	37	127	13
Puerto Rico	1	30	30	0	0	0
South Carolina	1	92	92	0	0	0
Tennessee	4	202	188	4	10	0
Texas	16	612	531	35	32	14
Utah	3	120	87	31	2	0
Vermont	1	21	21	0	0	0
Virgin Islands	1	0	0	0	0	0
Virginia	3	116	114	0	2	0
Washington	5	168	156	3	8	1
West Virginia	2	35	34	1	0	0
Wisconsin	3	302	252	43	5	2

NOTE: The following States have no Medicare-approved transplant centers: Alaska, Delaware, Idaho, Montana, Nevada, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 28
Number of kidney transplants performed and type of donor, by State: 1988

State	Centers reporting	Total patients	Total transplants	Living-related		Living-unrelated		Cadaveric	
				Total	Percent	Total	Percent	Total	Percent
Total	208	8,909	8,932	1,761	19.7	56	0.6	7,115	79.7
Alabama	2	218	218	61	28.0	0	0.0	157	72.0
Arizona	4	142	142	15	10.6	0	0.0	127	89.4
Arkansas	3	36	36	14	38.9	0	0.0	22	61.1
California	21	1,189	1,192	174	14.6	6	0.5	1,012	84.9
Colorado	3	133	133	13	9.8	0	0.0	120	90.2
Connecticut	2	102	102	20	19.6	0	0.0	82	80.4
District of Columbia	5	189	189	29	15.3	2	1.1	158	83.6
Florida	4	397	397	69	17.4	0	0.0	328	82.6
Georgia	5	271	271	62	22.9	3	1.1	206	76.0
Hawaii	1	16	16	2	12.5	0	0.0	14	87.5
Illinois	8	351	351	69	19.7	1	0.3	281	80.1
Indiana	2	146	146	28	19.2	1	0.7	117	80.1
Iowa	4	92	92	13	14.1	0	0.0	79	85.9
Kansas	2	48	48	4	8.3	1	2.1	43	89.6
Kentucky	3	93	94	27	28.7	2	2.1	65	69.1
Louisiana	6	132	132	30	22.7	1	0.8	101	76.5
Maine	1	35	35	12	34.3	0	0.0	23	65.7
Maryland	3	106	106	19	17.9	0	0.0	87	82.1
Massachusetts	9	308	309	76	24.6	2	0.6	231	74.8
Michigan	9	295	295	59	20.0	0	0.0	236	80.0
Minnesota	4	292	296	79	26.7	2	0.7	215	72.6
Mississippi	1	21	21	0	0.0	0	0.0	21	100.0
Missouri	9	248	248	61	24.6	3	1.2	184	74.2
Nebraska	3	64	64	2	3.1	0	0.0	62	96.9
New Jersey	3	90	90	4	4.4	0	0.0	86	95.6
New Mexico	2	65	65	11	16.9	0	0.0	54	83.1
New York	14	529	531	126	23.7	5	0.9	400	75.3
North Carolina	5	190	191	48	25.1	2	1.0	141	73.8
North Dakota	1	1	1	1	100.0	0	0.0	0	0.0
Ohio	12	496	498	88	17.7	5	1.0	405	81.3
Oklahoma	6	118	118	38	32.2	1	0.8	79	66.9
Oregon	1	121	121	30	24.8	0	0.0	91	75.2
Pennsylvania	10	677	681	91	13.4	4	0.6	586	86.0
Puerto Rico	1	30	30	12	40.0	0	0.0	18	60.0
South Carolina	1	92	92	11	12.0	1	1.1	80	87.0
Tennessee	4	202	202	41	20.3	0	0.0	161	79.7
Texas	16	612	614	114	18.6	2	0.3	498	81.1
Utah	3	120	120	39	32.5	0	0.0	81	67.5
Vermont	1	21	21	7	33.3	0	0.0	14	66.7
Virgin Islands	1	0	0	0	0.0	0	0.0	0	0.0
Virginia	3	116	116	19	16.4	1	0.9	96	82.8
Washington	5	168	168	61	36.3	0	0.0	107	63.7
West Virginia	2	35	35	9	25.7	1	2.9	25	71.4
Wisconsin	3	302	305	73	23.9	10	3.3	222	72.8

NOTE: Percents may not add to total because of rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, Nevada, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Table 29
Distribution of kidney transplants and number of transplants, by State: 1988

State	Centers reporting	Total transplants	0-15		16-50		51-100		101-200		201 or more	
			Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Total	208	8,932	51	24.5	99	47.6	40	19.2	15	7.2	3	1.4
Alabama	2	218	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0
Arizona	4	142	1	25.0	2	50.0	0	0.0	1	25.0	0	0.0
Arkansas	3	36	2	66.7	1	33.3	0	0.0	0	0.0	0	0.0
California	21	1,192	5	23.8	11	52.4	2	9.5	2	9.5	1	4.8
Colorado	3	133	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
Connecticut	2	102	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
District of Columbia	5	189	2	40.0	2	40.0	0	0.0	1	20.0	0	0.0
Florida	4	397	0	0.0	0	0.0	2	50.0	2	50.0	0	0.0
Georgia	5	271	2	40.0	0	0.0	2	40.0	1	20.0	0	0.0
Hawaii	1	16	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Illinois	8	351	2	25.0	3	37.5	3	37.5	0	0.0	0	0.0
Indiana	2	146	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
Iowa	4	92	3	75.0	0	0.0	1	25.0	0	0.0	0	0.0
Kansas	2	48	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
Kentucky	3	94	1	33.3	1	33.3	1	33.3	0	0.0	0	0.0
Louisiana	6	132	1	16.7	5	83.3	0	0.0	0	0.0	0	0.0
Maine	1	35	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Maryland	3	106	0	0.0	2	66.7	1	33.3	0	0.0	0	0.0
Massachusetts	9	309	1	11.1	5	55.6	3	33.3	0	0.0	0	0.0
Michigan	9	295	3	33.3	4	44.4	2	22.2	0	0.0	0	0.0
Minnesota	4	296	0	0.0	2	50.0	1	25.0	1	25.0	0	0.0
Mississippi	1	21	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Missouri	9	248	3	33.3	5	55.6	1	11.1	0	0.0	0	0.0
Nebraska	3	64	2	66.7	1	33.3	0	0.0	0	0.0	0	0.0
New Jersey	3	90	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0
New Mexico	2	65	0	0.0	2	100.0	0	0.0	0	0.0	0	0.0
New York	14	531	3	21.4	8	57.1	3	21.4	0	0.0	0	0.0
North Carolina	5	191	0	0.0	3	60.0	2	40.0	0	0.0	0	0.0
North Dakota	1	1	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Ohio	12	498	4	33.3	5	41.7	1	8.3	2	16.7	0	0.0
Oklahoma	6	118	2	33.3	4	66.7	0	0.0	0	0.0	0	0.0
Oregon	1	121	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Pennsylvania	10	681	1	10.0	3	30.0	4	40.0	1	10.0	1	10.0
Puerto Rico	1	30	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
South Carolina	1	92	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
Tennessee	4	202	1	25.0	1	25.0	2	50.0	0	0.0	0	0.0
Texas	16	614	5	31.3	7	43.8	3	18.8	1	6.3	0	0.0
Utah	3	120	1	33.3	1	33.3	1	33.3	0	0.0	0	0.0
Vermont	1	21	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
Virgin Islands	1	0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Virginia	3	116	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0
Washington	5	168	1	20.0	3	60.0	1	20.0	0	0.0	0	0.0
West Virginia	2	35	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0
Wisconsin	3	305	1	33.3	0	0.0	0	0.0	2	66.7	0	0.0

NOTE: Percentages may not add to 100% due to rounding. The following States have no Medicare-approved kidney transplant centers: Alaska, Delaware, Idaho, Montana, Nevada, New Hampshire, Rhode Island, South Dakota, Wyoming, American Samoa, Guam, and Mariana Islands.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the End Stage Renal Disease Facility Survey, 1988.

Veterans' Administration dialysis statistics

As of December 31, 1988, there were 57 Veterans' Administration (VA) dialysis centers and 27 Veterans' Administration satellite centers providing services to dialysis patients. The statistics displayed in Table 30 include 730 patients (none of whom are on acute dialysis) who were dialyzing in 15 Medicare-approved Veterans' Administration facilities.

Data on the number of continuous ambulatory peritoneal dialysis (CAPD) patients are not captured as a separate category by the VA. However, it is presumed that a large portion of the peritoneal patients are on CAPD.

The patient counts in Table 30 reflect counts taken on December 31 each year. The total number of patients receiving dialysis on a contract/fee-basis in non-VA units at VA expense remained about the same for the years reported. The decrease from 3,754 patients in 1987 to 3,722 patients in 1988 reflects a net decline of only .9 percent. The number of patients dialyzing at home, at the end of each year, declined more significantly from 985 patients in 1987 to 860 patients in 1988—a decrease of 12.7 percent. The number of patients receiving assisted hemodialysis in VA centers also remained about the same, increasing from 1,569 in 1987 to 1,602 in 1988—an increase of 1.7 percent. However, the number of patients receiving acute dialysis services from the VA increased from 119 in 1987 to 186 in 1988—an increase of 56.3 percent.

Table 30
Number of patients for Veterans' Administration dialysis activities, by type of dialysis: 1987-88

Type of dialysis	December 31, 1987			December 31, 1988		
	Dialysis center patients	Satellite dialysis center patients	Contract fee	Dialysis center patients	Satellite dialysis center patients	Contract fee
All modalities	2,818	339	597	2,757	375	590
Acute hemodialysis	90	27	—	146	31	—
Acute peritoneal dialysis	2	0	—	9	0	—
Assisted hemodialysis	1,569	253	—	1,602	287	—
Assisted peritoneal dialysis	42	0	—	41	4	—
Limited hemodialysis	146	8	—	121	0	—
Limited peritoneal dialysis	1	1	—	0	0	—
Home self-hemodialysis training	23	0	—	20	1	—
Home self-peritoneal dialysis training	4	6	—	10	0	—
Home hemodialysis	432	10	—	365	13	—
Home peritoneal dialysis	509	34	—	443	39	—
Hemodialysis	—	—	578	—	—	558
Peritoneal dialysis	—	—	19	—	—	32

SOURCE: Veterans' Administration, Department of Medicine and Surgery: Data from the Division of Clinical Affairs, Medical Service Section, 1987-88.

Survival analyses

Program experience with respect to both patient and graft survival from onset of renal failure, or from date of kidney transplant, to 5 years subsequent is discussed in this section. This analysis covers the period from January 1, 1984 through December 31, 1987. All Medicare beneficiaries with renal failure occurring on or after January 1, 1984 through December 31, 1987 were included in the analysis of dialysis survival. The transplant survival analysis included Medicare beneficiaries whose transplants occurred on or after January 1, 1984 through December 31, 1987. The total number of persons included in the computation of dialysis patient survival was 120,685. The total number of transplants included in the computation of transplant survival was 30,077 (23,303 cadaveric donor transplants and 6,774 living-related donor transplants). Patient and graft survival were tracked through March 31, 1989.

Data

The computation of survival rates for dialysis patients required a date of renal failure onset along with the date of death or the date of transplantation (if the patient was subsequently transplanted). Computation of survival rates for transplant patients required the date of transplantation and the date of death (for patient survival) or the date of graft failure (for graft survival). The date of renal failure onset was defined as the date of first dialysis and was taken from the patient's medical evidence records (HCFA-2728) or the outpatient dialysis records (HCFA-1483 or HCFA-1450). In the absence of these records, the date of renal failure onset was estimated from the entitlement records. The date of death was obtained from the Master Beneficiary Records that are maintained for all Medicare beneficiaries. The date of transplant was obtained from the transplant form (HCFA-2745) or from the inpatient hospital bill (HCFA-1453 or HCFA-1450). The date of transplant failure was obtained from the transplant follow-up form, was calculated based on a record of outpatient dialysis sessions, or was based on the date of a subsequent transplant.

Survival rates were calculated using a standard actuarial modified life-table analysis. For dialysis patients, survival was measured from the date of renal failure onset until death, with right censoring for transplantation or the end of the observation period (March 31, 1989). For transplants, patient survival was measured from the date of transplantation until death, with right censoring for the end of the observation period. Graft survival for transplants was measured from the date of transplantation until graft failure date or date of death, with right censoring for the end of the observation period.

Because there are significant age differences among the population subgroups (for example, white persons on dialysis are generally older than black persons on dialysis and persons whose renal failure is due to hypertension are generally older than persons whose renal failure is due to diabetes), the survival rates for each sex, race, and primary diagnostic subgroup were age-adjusted to the age distribution for all persons in each table. For example, survival rates for males and females on dialysis were age-adjusted to the age distribution for all persons on dialysis. Individual survival rates among cadaveric donor transplants were age-adjusted to all cadaveric donor transplants, and individual survival rates among living-related donor transplants were age-adjusted to all living-related donor transplants. Therefore, survival differences among population subgroups due to age differences were largely eliminated.

Results

The results of the analysis of dialysis patient survival are presented in Table 31. At 1 year following renal failure onset, 77.7 percent of patients were still alive. At 3 years this had decreased to 49.9 percent and at 5 years to 34.3 percent. There were notable differences by age group. The two groups comprised of persons less than 25 years of age (at the time of renal failure) had a combined 1-year survival rate of 95 percent. However, in subsequent years, survival was higher for persons 0 to 14 years of age than for persons 15 to 24 years of age. Consequently, by 5 years post renal failure, persons 0 to 14 years of age had a cumulative survival rate of 84.3 percent, compared to 70.8 percent among persons 15 to 24 years of age. The rate of survival decreased for each older age cohort. For those over 75 years of age, the 1-year survival was only 56.9 percent; less than one-quarter (23.0 percent) survived 3 years; and only 10.1 percent survived 5 years on dialysis after renal failure. At the end of 1 year, the survival rate for females was 2.1 percent greater than the rate for males (78.7 percent and 76.6 percent, respectively). At 3 years, females had a cumulative survival rate that was 5.8 percent greater than the survival rate for males (51.8 percent and 46.0 percent, respectively). However, by the end of the fifth year, the survival rate for female dialysis patients was 7.9 percent greater than the rate for males (36.6 percent and 28.7 percent, respectively).

By racial group, the highest survival rates for dialysis patients were found, generally, among Asian and black persons. Over the first 4 years, 1 percentage point or less separated the survival rates for these two groups. The greatest difference in dialysis patient survival rates was found between Asian persons and white persons. The rate for Asian persons exceeded the rate for white persons by 7.3 percent in year 1 (83.1 percent and 75.8 percent, respectively) and by 13.0 percent in year 5 (44.5 percent and 31.5 percent, respectively). Survival rates for white persons were consistently below survival rates for all other racial groups.

¹ Right censoring is a technique for handling cases in which the person is still alive at the end of the observation period. The life table calculation stops at the right censor date for these persons. However, unlike a withdrawal because of death, there is no increment to the number of deaths.

Table 31
Dialysis patient survival, by age, sex, race, and primary disease: 1984-87

Age, sex, race, and primary disease	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	120,685	77.7 (0.1)	61.7 (0.2)	49.9 (0.2)	41.0 (0.2)	34.3 (0.3)
Age						
Under 15 years	1,688	94.9 (0.7)	89.7 (1.1)	87.5 (1.4)	84.3 (2.1)	84.3 (2.1)
15 - 24 years	4,765	95.0 (0.4)	90.1 (0.6)	84.6 (0.9)	78.9 (1.2)	70.8 (2.0)
25 - 34 years	11,049	90.8 (0.3)	80.1 (0.5)	71.0 (0.6)	62.8 (0.8)	58.8 (1.1)
35 - 44 years	13,901	89.6 (0.3)	77.1 (0.4)	67.5 (0.6)	59.8 (0.7)	53.7 (0.9)
45 - 54 years	17,242	86.7 (0.3)	72.6 (0.4)	60.1 (0.5)	50.2 (0.6)	42.1 (0.7)
55 - 64 years	27,776	79.5 (0.2)	62.2 (0.3)	48.9 (0.3)	38.6 (0.4)	30.3 (0.5)
65 - 74 years	29,078	67.0 (0.3)	47.5 (0.3)	34.8 (0.3)	25.6 (0.3)	18.6 (0.4)
75 years or over	15,186	56.9 (0.4)	35.8 (0.4)	23.0 (0.4)	15.1 (0.4)	10.1 (0.5)
Sex						
Male	66,079	76.6 (0.2)	59.0 (0.2)	46.0 (0.2)	36.1 (0.3)	28.7 (0.3)
Female	54,606	78.7 (0.2)	63.3 (0.2)	51.8 (0.3)	43.2 (0.3)	36.6 (0.4)
Race						
White	82,266	75.8 (0.2)	58.9 (0.2)	46.9 (0.2)	38.2 (0.2)	31.5 (0.3)
Black	33,818	82.2 (0.2)	67.5 (0.3)	56.1 (0.3)	46.7 (0.4)	39.4 (0.5)
Asian	1,914	83.1 (0.9)	68.5 (1.2)	55.6 (1.5)	46.4 (1.7)	44.5 (2.3)
American Indian	1,196	81.3 (1.1)	65.0 (1.5)	53.3 (1.7)	42.7 (2.1)	39.3 (2.7)
Other/Unknown	1,491	77.0 (1.0)	64.0 (1.3)	49.9 (1.6)	44.0 (2.0)	40.7 (3.1)
Primary disease						
Diabetes	34,487	73.5 (0.2)	51.8 (0.3)	37.2 (0.3)	26.8 (0.4)	20.0 (0.4)
Hypertension	30,034	79.9 (0.3)	66.0 (0.3)	54.8 (0.3)	45.8 (0.4)	39.2 (0.5)
Glomerulonephritis	24,593	82.8 (0.3)	69.4 (0.3)	58.5 (0.4)	49.7 (0.5)	42.5 (0.6)
Polycystic kidney disease	4,630	89.5 (0.4)	79.6 (0.6)	70.8 (0.9)	63.0 (1.0)	52.1 (1.6)
Other	12,385	73.4 (0.4)	58.9 (0.5)	48.4 (0.5)	40.6 (0.6)	34.4 (0.8)
Unknown	14,556	75.0 (0.4)	61.1 (0.5)	51.1 (0.5)	44.1 (0.6)	38.0 (0.8)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all dialysis patients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1984-87.

In terms of the reported cause of renal failure (i.e., the primary diagnosis), the lowest survival rates were found among those patients with diabetes and those with hypertension. At 1 year, the survival rate for dialysis patients with a primary diagnosis of diabetes was 6.4 percent lower than those patients whose primary diagnosis was hypertension (73.5 percent and 79.9 percent, respectively). At 5 years, the difference in survival rates had increased to 19.2 percent. Persons with a primary diagnosis of diabetes had a 20.0 percent survival rate, while those with a primary diagnosis of hypertension had a 39.2 percent survival rate. Persons whose renal failure is attributed to glomerulonephritis have a 5-year survival rate of 42.5 percent, and persons whose renal failure is attributed to polycystic kidney disease have a 5-year survival rate of 52.1 percent.

Patient survival rates for persons with cadaver donor transplants and living-related donor transplants are presented in Tables 32 and 33, respectively. Among cadaver donor transplant patients, survival rates were 91.6 percent at 1 year, 83.6 percent at 3 years, and 75.9 percent at 5 years. The data also show that the likelihood of patient survival decreases with advancing age. The 3-year survival rate was 91.0 percent for persons less than 25 years of age, falling to 69.0 percent for persons 65 to 74 years of age. The 5-year survival rate for cadaver donor transplant patients was

88.0 percent for persons less than 25 years of age, decreasing to 75.4 percent for persons 65 to 74 years of age. In general, females had a higher survival rate than did males after a cadaver donor transplant. At year 1, the female survival rate (92.0 percent) exceeded the male survival rate (91.3 percent) by 0.7 percent. By year 5, the female survival rate (78.0 percent) exceeded the male survival rate (74.7 percent) by 3.3 percent.

The 3-year survival rates for cadaver donor transplant patients exceeded 80 percent for all race categories reported. At 5 years, Asian persons experienced the highest survival rate (83.6 percent).

In terms of the reported cause for renal failure, the lowest survival rates, across the 5 years reported, were found for those patients with diabetes. At year 1, the survival rate for the diabetic group (87.6 percent) was 4.6 percent lower than the next lowest group—those for whom renal failure was attributed to hypertension (92.2 percent). By year 5, the survival rate for the diabetic group had declined to 63.4 percent, and was 12 percent lower than the next lower category—again the hypertension category, which had a survival rate of 75.4 percent.

Eighty-five percent of all cadaver transplants between 1984 and 1987 were first transplants. Patient survival was slightly higher for first transplants than for subsequent transplants (76.3 percent and 75.3 percent, respectively) at 5 years post transplant.

The data in Table 33 indicate that, among living-related donor transplant patients, the survival rate for year 1 was 96.6 percent, for year 3 was 92.7 percent, and for year 5 was 88.8 percent. As with cadaver donor recipients, survival decreased with age. At year 1, all age groups had survival rates that exceeded 90 percent. At year 3, the survival rate for those people under 25 years of age still exceeded 95 percent (about 96 percent), while the rate for those between 65 and 74 years of age dropped to 74 percent. Finally, in year 5, the survival rate for those under 25 years of age continued to be higher than 90 percent (about 94 percent), while the rate for those between 65 and 74 years of age dropped to 44.6 percent. The difference in the survival rates for males and females remained at less than 1 percent through year 4. In year 5, the female rate (89.8 percent) was 1.4 percent greater than the male rate (88.4 percent).

Among the races reported, Asian persons consistently had the highest survival rate for the 5 years. At year 5, the survival rate for Asian persons was 92.1 percent, followed by white persons at 89.2 percent, black persons

at 86.7 percent, and American Indians at 68.2 percent. Again, as with cadaver donor transplants, the survival rate for living-related donor transplant patients was generally lower for persons for whom diabetes was found to be the primary cause of renal failure. And, again, by year 5, the survival rate for the diabetic group (77.2 percent) was almost 12 percent lower than for the hypertensive group (89.1 percent).

Living donor transplants as a second or subsequent transplant were fairly unusual, accounting for only 5 percent of living donor transplants. Patient survival at 5 years was lower (82.8 percent) for subsequent living donor transplants than for first living donor transplants (89.3 percent).

Kidney graft survival rates for cadaveric transplants and living-related donor transplants are presented in Tables 34 and 35, respectively. Among cadaver donor transplants, 73.6 percent of the kidney grafts survived for at least 1 year; 61.0 percent survived 3 years; and 52.5 percent were still functioning at year 5. There was about a 10 percent difference in graft survival across age

Table 32
Cadaver donor transplant patient survival, by age, sex, race, and primary disease: 1984-87

Age, sex, race, and primary disease	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	23,303	91.6 (0.2)	87.6 (0.2)	83.6 (0.3)	79.7 (0.3)	75.9 (0.4)
Age						
Under 15 years	819	93.4 (0.9)	91.5 (1.0)	88.6 (1.2)	87.4 (1.3)	86.1 (1.6)
15 - 24 years	2,467	96.0 (0.4)	93.9 (0.5)	92.2 (0.6)	90.1 (0.7)	88.7 (0.9)
25 - 34 years	5,509	94.1 (0.3)	90.7 (0.4)	87.7 (0.5)	83.6 (0.6)	79.8 (0.9)
35 - 44 years	6,452	92.5 (0.3)	88.5 (0.4)	83.1 (0.5)	78.9 (0.6)	75.8 (0.8)
45 - 54 years	5,024	89.2 (0.4)	84.5 (0.5)	80.4 (0.6)	75.8 (0.8)	71.1 (1.1)
55 - 64 years	2,680	85.7 (0.7)	80.1 (0.8)	74.5 (0.9)	70.8 (1.1)	64.5 (1.6)
65 - 74 years	343	82.8 (2.0)	75.8 (2.4)	69.0 (2.9)	62.0 (4.0)	57.4 (5.8)
75 years or over	9	—	—	—	—	—
Sex						
Male	14,729	91.3 (0.2)	86.9 (0.3)	82.4 (0.3)	78.6 (0.4)	74.7 (0.6)
Female	8,574	92.0 (0.3)	88.7 (0.3)	85.4 (0.4)	81.2 (0.5)	78.0 (0.7)
Race						
White	17,187	91.6 (0.2)	87.8 (0.3)	83.7 (0.3)	80.1 (0.4)	76.4 (0.5)
Black	5,354	91.7 (0.4)	87.0 (0.5)	82.8 (0.6)	77.9 (0.7)	74.2 (0.9)
Asian	469	92.1 (1.2)	87.7 (1.5)	85.8 (1.7)	83.6 (2.1)	83.6 (2.1)
American Indian	210	92.8 (1.8)	87.5 (2.4)	81.9 (3.0)	75.0 (4.2)	75.0 (6.5)
Other/Unknown	83	92.0 (2.4)	85.0 (3.0)	83.5 (3.5)	81.4 (3.5)	81.4 (3.5)
Primary disease						
Diabetes	4,290	87.6 (0.5)	80.6 (0.6)	74.1 (0.7)	67.5 (0.9)	63.4 (1.3)
Hypertension	3,129	92.2 (0.5)	88.0 (0.6)	84.0 (0.8)	80.7 (0.9)	75.4 (1.3)
Glomerulonephritis	7,430	93.4 (0.3)	90.7 (0.3)	87.6 (0.4)	84.7 (0.5)	81.3 (0.7)
Polycystic kidney disease	1,839	92.3 (0.7)	89.5 (0.8)	85.9 (0.9)	83.8 (1.1)	81.6 (1.5)
Other	2,632	92.1 (0.5)	88.9 (0.6)	85.8 (0.7)	81.7 (0.9)	78.3 (0.0)
Unknown	3,983	91.5 (0.4)	88.0 (0.5)	83.4 (0.6)	79.6 (0.8)	76.9 (1.0)
Transplant number						
First transplant	19,701	91.7 (0.2)	87.8 (0.2)	83.7 (0.3)	80.0 (0.4)	76.3 (0.5)
Subsequent transplants	3,602	91.1 (0.5)	87.1 (0.6)	83.1 (0.7)	78.5 (0.8)	75.3 (1.1)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1984-87.

Table 33
Living-related donor transplant patient survival, by age, sex, race, and primary disease: 1984-87

Age, sex, race, and primary disease	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	6,774	96.6 (0.2)	94.6 (0.3)	92.7 (0.3)	90.3 (0.4)	88.8 (0.6)
Age						
Under 15 years	721	98.2 (0.5)	97.0 (0.7)	96.2 (0.8)	95.6 (0.9)	94.8 (1.1)
15-24 years	1,365	98.5 (0.3)	97.4 (0.4)	96.5 (0.5)	95.3 (0.7)	94.5 (0.9)
25-34 years	2,150	96.9 (0.4)	95.4 (0.5)	94.0 (0.5)	92.1 (0.7)	90.4 (0.9)
35-44 years	1,410	95.8 (0.5)	93.9 (0.7)	92.1 (0.8)	89.5 (1.0)	87.9 (1.3)
45-54 years	807	93.6 (0.9)	88.9 (1.1)	83.3 (1.4)	78.3 (1.8)	76.8 (2.0)
55-64 years	295	93.6 (1.4)	89.2 (1.9)	87.5 (2.1)	82.5 (2.9)	76.7 (4.8)
65-74 years	24	95.8 (4.1)	84.9 (8.1)	74.3 (12.2)	44.6 (17.9)	44.6 (17.9)
75 years or over	2	—	—	—	—	—
Sex						
Male	4,035	96.9 (0.3)	94.9 (0.4)	92.9 (0.4)	90.3 (0.6)	88.4 (0.7)
Female	2,739	96.2 (0.4)	94.1 (0.5)	92.4 (0.5)	90.6 (0.7)	89.8 (0.8)
Race						
White	5,780	96.8 (0.2)	94.9 (0.3)	93.2 (0.4)	90.8 (0.5)	89.2 (0.6)
Black	807	95.4 (0.8)	92.9 (1.0)	89.7 (1.2)	87.6 (1.4)	86.7 (1.7)
Asian	95	96.8 (3.3)	94.0 (3.7)	94.0 (3.7)	92.1 (4.3)	92.1 (4.3)
American Indian	73	95.4 (2.7)	92.4 (3.3)	84.7 (4.6)	68.2 (4.6)	68.2 (4.6)
Other/unknown	19	—	—	—	—	—
Primary disease						
Diabetes	1,349	93.8 (0.7)	90.3 (0.8)	86.5 (1.0)	82.2 (1.3)	77.2 (1.6)
Hypertension	513	97.2 (0.9)	94.5 (1.2)	93.2 (1.4)	91.2 (1.8)	89.1 (2.1)
Glomerulonephritis	2,339	97.1 (0.3)	95.9 (0.4)	94.4 (0.5)	92.3 (0.7)	91.1 (0.8)
Polycystic kidney disease	270	99.5 (0.7)	98.8 (1.0)	98.1 (1.4)	97.8 (1.6)	96.9 (1.6)
Other	1,179	97.2 (0.4)	95.1 (0.6)	94.1 (0.6)	93.1 (0.8)	92.7 (1.0)
Unknown	1,124	97.5 (0.5)	95.6 (0.6)	94.6 (0.7)	93.5 (0.8)	91.2 (1.3)
Transplant number						
First transplant	6,427	96.8 (0.2)	94.8 (0.3)	93.0 (0.3)	90.7 (0.4)	89.3 (0.6)
Subsequent transplants	347	94.0 (1.3)	90.4 (1.6)	88.6 (1.8)	86.3 (2.2)	82.8 (3.2)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1984-87.

groups and years. The age group of less than 15 years of age, which experienced the highest patient survival rate after a cadaver donor transplant (see Table 32), generally experienced the lowest graft survival rates in a cadaver donor transplant (65.7 percent in year 1 decreasing to 46.3 percent in year 5). The 65 to 74 years of age group, which experienced the lowest patient survival for cadaver donor transplant, also experienced relatively low graft survival rates for cadaver donor transplants (70.0 percent in year 1 and 48.0 percent in year 5).

Asian persons with a cadaver transplant had the highest 3-year graft survival rate (68.7 percent), followed by white persons (63.4 percent), American Indians (57.8 percent), and black persons (52.6 percent). At year 5, the graft survival rate continued to be the highest for Asian persons (66.0 percent) followed by the rates for white persons (55.5 percent), American Indians (54.7 percent), and black persons (42.1 percent).

The lowest 3-year graft survival rate for cadaver donor transplants was found among those people for whom the primary cause of renal failure was attributed to hypertension (55.5 percent). By year 5, the rate for hypertension had declined to 46.2 percent, followed by

the next highest survival rate, which was for diabetes (49.0 percent), then for glomerulonephritis (56.4 percent), and polycystic kidney disease (59.5 percent).

First cadaver transplants had higher first year graft survival rates than subsequent cadaver transplants (75.1 percent and 65.1 percent, respectively). This 10 percent differential remained constant through the fifth year post transplantation.

Among living-related donor transplants, 88.5 percent of the kidney grafts survived to year 1; 79.8 percent survived to year 3; and 72.6 percent survived to year 5. There was no clear pattern of graft survival across age groups.

At 3 years, the living-related donor graft survival rates for males and females were essentially equivalent (80.0 percent and 79.5 percent, respectively). At year 5, the graft survival rate for females (74.5 percent) exceeded the rate for males (71.5 percent) by 3 percent.

As with cadaver donor transplants, graft survival was lowest for black persons (81.5 percent survival at 1 year post transplant). The other three racial groups had 1-year graft survival rates of nearly 90 percent. By primary disease category, the 5-year graft survival rates

Table 34

Cadaver donor transplant graft survival of patients, by age, sex, race, and primary disease: 1984-87

Age, sex, race, and primary disease	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	23,303	73.6 (0.3)	66.7 (0.3)	61.0 (0.3)	56.0 (0.4)	52.5 (0.5)
Age						
Under 15 years	819	65.7 (1.7)	56.7 (1.8)	50.7 (1.9)	46.3 (2.0)	43.6 (2.3)
15-24 years	2,467	72.2 (0.9)	64.5 (1.0)	58.6 (1.1)	53.8 (1.2)	50.1 (1.4)
25-34 years	5,509	74.9 (0.6)	67.5 (0.6)	61.5 (0.7)	56.0 (0.8)	53.4 (1.0)
35-44 years	6,452	73.7 (0.6)	66.8 (0.6)	61.0 (0.7)	55.7 (0.8)	52.8 (0.9)
45-54 years	5,024	73.9 (0.6)	68.1 (0.7)	62.9 (0.7)	58.3 (0.8)	53.3 (1.1)
55-64 years	2,680	74.3 (0.8)	67.8 (0.9)	61.9 (1.0)	58.1 (1.2)	54.1 (1.5)
65-74 years	343	70.0 (2.5)	64.0 (2.7)	59.1 (3.0)	53.1 (3.9)	48.0 (6.0)
75 years or over	9	—	—	—	—	—
Sex						
Male	14,729	73.8 (0.4)	66.4 (0.4)	60.3 (0.4)	55.3 (0.5)	51.6 (0.6)
Female	8,574	73.3 (0.5)	67.3 (0.5)	62.4 (0.6)	57.4 (0.6)	54.4 (0.8)
Race						
White	17,187	74.4 (0.3)	68.7 (0.4)	63.4 (0.4)	59.0 (0.5)	55.5 (0.6)
Black	5,354	70.1 (0.6)	59.6 (0.7)	52.6 (0.7)	45.8 (0.9)	42.1 (1.0)
Asian	469	78.9 (1.9)	73.1 (2.1)	68.7 (2.3)	66.0 (2.6)	66.0 (3.0)
American Indian	210	77.4 (2.9)	65.2 (3.4)	57.8 (3.7)	54.7 (4.2)	54.7 (0.0)
Other/unknown	83	74.3 (4.6)	68.9 (4.9)	67.0 (5.2)	58.2 (7.1)	58.2 (0.0)
Primary disease						
Diabetes	4,290	72.0 (0.7)	64.6 (0.7)	58.5 (0.8)	52.7 (1.0)	49.0 (1.2)
Hypertension	3,129	72.8 (0.8)	62.8 (0.9)	55.5 (1.0)	49.3 (1.1)	46.2 (1.4)
Glomerulonephritis	7,430	75.2 (0.5)	69.2 (0.6)	63.9 (0.6)	59.3 (0.7)	56.4 (0.8)
Polycystic kidney disease	1,839	73.2 (1.0)	68.4 (1.1)	63.5 (1.2)	60.9 (1.3)	59.5 (1.6)
Other	2,632	73.6 (0.9)	67.6 (0.9)	62.9 (1.0)	59.5 (1.1)	57.4 (1.4)
Unknown	3,983	73.4 (0.7)	66.8 (0.8)	61.0 (0.8)	54.6 (1.0)	50.7 (1.2)
Transplant number						
First transplant	19,701	75.1 (0.3)	68.4 (0.3)	62.6 (0.4)	57.7 (0.4)	54.0 (0.5)
Subsequent transplants	3,602	65.1 (0.8)	57.7 (0.8)	52.3 (0.9)	47.0 (1.0)	44.3 (1.2)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all cadaver donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1984-87.

were, again, lowest for persons whose renal failure was attributed to hypertension (65.9 percent) or to diabetes (66.2 percent). Higher graft survival rates were found for those persons with glomerulonephritis (74.8 percent) and with polycystic kidney disease (86.0 percent).

The difference in survival rates for the graft in living-related donor transplants between first and subsequent

transplants decreased over the 5 years reported. In year 1, first transplant grafts survived 6.7 percent longer than grafts in subsequent transplants (88.8 percent and 82.1 percent, respectively). By year 5, first transplant grafts for living-related donor transplants survived only 2.6 percent longer than subsequent transplants (72.8 percent and 70.2 percent, respectively).

Table 35
**Living-related donor transplant graft survival of patients, by age,
 sex, race, and primary disease: 1984-87**

Age, sex, race, and primary disease	Total	Percent surviving				
		1 year	2 years	3 years	4 years	5 years
All persons	6,774	88.5 (0.4)	84.0 (0.5)	79.8 (0.5)	75.8 (0.6)	72.6 (0.8)
Age						
Under 15 years	721	86.3 (1.3)	81.1 (1.5)	76.9 (1.7)	72.1 (2.0)	69.1 (2.4)
15 - 24 years	1,365	89.7 (0.8)	84.3 (1.0)	79.9 (1.2)	76.3 (1.4)	72.4 (1.8)
25 - 34 years	2,150	90.1 (0.7)	86.7 (0.7)	82.8 (0.9)	79.3 (1.0)	76.8 (1.3)
35 - 44 years	1,410	87.9 (0.9)	84.6 (1.0)	80.8 (1.1)	76.9 (1.3)	73.9 (1.7)
45 - 54 years	807	86.1 (1.2)	80.0 (1.4)	73.8 (1.7)	68.9 (2.0)	66.0 (2.4)
55 - 64 years	295	86.4 (2.0)	81.4 (2.3)	77.4 (2.7)	74.4 (3.1)	65.8 (5.4)
65 - 74 years	24	79.2 (8.3)	58.1 (10.9)	58.1 (10.9)	29.0 (15.5)	29.0 (15.5)
75 years or over	2	—	—	—	—	—
Sex						
Male	4,035	88.8 (0.5)	84.3 (0.6)	80.0 (0.7)	75.6 (0.8)	71.5 (1.1)
Female	2,739	88.0 (0.6)	83.6 (0.7)	79.5 (0.8)	76.1 (1.0)	74.5 (1.1)
Race						
White	5,780	89.4 (0.4)	85.6 (0.5)	81.7 (0.5)	78.1 (0.6)	74.6 (0.8)
Black	807	81.5 (1.4)	73.0 (1.6)	65.1 (1.8)	58.7 (2.1)	57.4 (2.3)
Asian	95	88.5 (3.3)	84.8 (3.7)	84.8 (3.7)	82.9 (4.3)	82.9 (4.3)
American Indian	73	92.0 (3.5)	84.9 (4.5)	79.2 (5.3)	74.9 (6.8)	72.7 (6.8)
Other/unknown	19	—	—	—	—	—
Primary disease						
Diabetes	1,349	82.3 (1.0)	78.4 (1.1)	74.1 (1.2)	70.6 (1.4)	66.2 (1.9)
Hypertension	513	89.3 (1.4)	80.3 (1.8)	75.0 (2.1)	68.4 (2.5)	65.9 (3.1)
Glomerulonephritis	2,339	88.6 (0.7)	84.3 (0.8)	80.2 (0.9)	76.5 (1.0)	74.8 (1.2)
Polycystic kidney disease	270	91.9 (1.8)	89.6 (2.1)	88.5 (2.3)	87.3 (2.6)	86.0 (2.6)
Other	1,179	88.5 (0.9)	85.1 (1.1)	81.3 (1.2)	78.3 (1.4)	75.4 (1.9)
Unknown	1,124	91.2 (0.9)	86.8 (1.0)	83.5 (1.2)	78.8 (1.5)	73.5 (2.1)
Transplant number						
First transplant	6,427	88.8 (0.4)	84.4 (0.5)	80.0 (0.5)	76.1 (0.6)	72.8 (0.8)
Subsequent transplants	347	82.1 (2.1)	77.6 (2.3)	75.3 (2.4)	72.1 (2.8)	70.2 (3.3)

NOTES: Numbers in parentheses represent the standard error of the estimate for each value. Rates based on fewer than 30 observations are not displayed. Survival rates for individual sex, race, and primary disease groups were age-adjusted to the age distribution of all living-related donor transplant recipients.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1984-87.

Utilization

Medicare inpatient hospital use

In 1987, there were 120,060¹ Medicare end stage renal disease (ESRD) beneficiaries who were eligible for Medicare benefits for at least part of the year (Tables 36, 37, 38, and 39). The analysis that follows considers inpatient utilization separately for each of the patient groups presented.

Persons on dialysis for the entire year, 1987

Utilization for persons on dialysis for the entire year of 1987 is shown in Table 36. There were 91,303 beneficiaries in this category and they comprised 76.0 percent of all Medicare ESRD beneficiaries who used benefits for at least part of the year. The age distribution shows that those younger than 24 years of age comprised 3.1 percent of this dialysis population; those between ages 25 to 54 comprised 36.1 percent; and those 55 years of age or older comprised 60.8 percent of this population. These beneficiaries were hospitalized 122,403 times and accounted for 1,153,654 days of inpatient care. This utilization resulted in a discharge rate per 1,000 beneficiaries of 1,341, a days of care rate per 1,000 beneficiaries of 12,635, and an average length of stay per discharge of 9.4 days. There was a direct and positive relationship between age and inpatient use; that is, the older the patient, the more hospitalization was experienced. Compared with persons 0-14 years of age, persons 65 years of age or over were hospitalized 1.5 times more often (968 discharges per 1,000 and 1,497 discharges per 1,000, respectively) and spent 1.7 times more days as an inpatient (9,168 days per 1,000 and 15,307 per 1,000, respectively). The average length of stay was shortest for persons 15-24 years of age (8.0 days per stay) and longest for persons 65 years of age or over (10.2 days per stay).

Persons who received a transplant during 1987

Utilization for persons receiving a transplant in 1987, for which Medicare was billed, is shown in Table 37. There were 7,541² beneficiaries in this category who accounted for 6.3 percent of all the Medicare ESRD beneficiaries who used benefits for at least part of the year. Those beneficiaries 24 years of age or younger comprised 15.7 percent of this population; those from ages 25 to 54 comprised 70.7 percent; while those 55 years of age or older comprised only 13.6 percent of this population. Because of the transplant stay itself and associated inpatient stays both before and after the transplant stay,

this population experiences high hospitalization usage. The 7,541 persons in this group had 16,601 hospitalizations and were hospitalized for a total of 208,029 days. This resulted in a discharge rate of 2,201 discharges per 1,000 beneficiaries and a days of care rate of 27,586 days per 1,000 beneficiaries. There was, again, a direct and positive relationship between age and inpatient use. Persons 65 years of age or over were hospitalized 1.3 times more often than persons 0-14 years of age (2,256 discharges per 1,000 and 1,745 discharges per 1,000, respectively) and spent 1.4 times more days as an inpatient (31,274 days per 1,000 and 22,402 per 1,000, respectively). Also, as found with dialysis patients, the average length of stay was shortest for persons 15-24 years of age (11.7 days per stay) and longest for persons 65 years of age or over (13.9 days per stay).

Persons who received a transplant prior to 1987

Utilization for persons who received successful transplants in previous years, and who were entitled to Medicare in 1987, is shown in Table 38. These counts also represent only those transplants billed to Medicare. The 19,881 persons in this group accounted for 16.6 percent of all Medicare ESRD beneficiaries who used benefits for at least part of 1987. The age distribution for this group is similar to that of persons transplanted in 1987; however, there is a larger population of patients in the 25 to 54 years of age group. Those beneficiaries 24 years of age or younger comprised 12.1 percent of this population; those from ages 25 to 54 comprised 73.9 percent; while those 55 years of age or older comprised 14.0 percent of this population. This group was hospitalized 13,186 times for a total of 115,255 days. This utilization amounts to a discharge rate of 633 per 1,000 beneficiaries and a days of care rate of 5,797 per 1,000 beneficiaries. Thus, the utilization of inpatient care is much less for this group than for either dialysis or transplant patients and, as is shown in Table 39, for the patients with graft failure. As found for the previous two groups, there was a direct relationship between age and inpatient use. Persons 65 years of age or over were hospitalized 1.5 times more often than persons 0-14 years of age (686 discharges per 1,000 and 445 discharges per 1,000, respectively) and spent 1.8 times more days as an inpatient (5,745 days per 1,000 and 3,266 per 1,000, respectively). In this group, the average length of stay was shortest for persons in the 0 to 14 years of age group (7.3 days per stay) and longest for persons in the 45 to 54 years of age group (9.5 days per stay).

¹This count will not match the program enrollment count in Table 6. Table 6 contains point prevalence information: that is, enrollment on December 31 of each year. This count contains period prevalence information; that is, counts of persons ever enrolled during the year.

²This count reflects only those transplants for which Medicare was billed. It will not agree with the count of transplants reported on the ESRD Facility Survey (see Table 13), because that count reflects transplants for all those patients eligible for Medicare regardless of who paid for the transplant.

Table 36
**Discharge rates for Medicare dialysis patients, by days of care rates,
average length of stay, and age: 1987**

Age	Number of patients	Number of inpatient days	Number of inpatient discharges	Discharges per 1,000 person	Days per 1,000 persons	Average length of stay
Total	91,303	1,153,654	122,403	1,341	12,635	9.4
Under 15 years	501	4,593	485	968	9,168	9.5
15-24 years	2,325	21,698	2,707	1,164	9,332	8.0
25-34 years	7,318	75,874	9,336	1,276	10,368	8.1
35-44 years	11,411	116,463	13,764	1,206	10,206	8.5
45-54 years	14,277	154,461	17,331	1,214	10,819	8.9
55-64 years	22,469	275,415	29,375	1,307	12,258	9.4
65 years and over	33,002	505,150	49,405	1,497	15,307	10.2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1987.

Table 37
**Discharge rates for Medicare kidney transplant patients, by days of care rates,
average length of stay, and age: 1987**

Age	Number of patients	Number of inpatient days	Number of inpatient discharges	Discharges per 1,000 person	Days per 1,000 persons	Average length of stay
Total	7,541	208,029	16,601	2,201	27,586	12.5
Under 15 years	353	7,908	616	1,745	22,402	12.8
15-24 years	832	20,679	1,774	2,132	24,855	11.7
25-34 years	1,749	49,799	4,118	2,354	28,473	12.1
35-44 years	2,041	57,136	4,578	2,243	27,994	12.5
45-54 years	1,541	42,243	3,208	2,082	27,413	13.2
55-64 years	857	25,010	1,928	2,250	29,183	13.0
65 years and over	168	5,254	379	2,256	31,274	13.9

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1987.

Table 38
**Discharge rates for Medicare functioning kidney graft patients,
by days of care rates, average length of stay, and age: 1987**

Age	Number of patients	Number of inpatient days	Number of inpatient discharges	Discharges per 1,000 person	Days per 1,000 persons	Average length of stay
Total	19,881	115,255	13,186	663	5,797	8.7
Under 15 years	564	1,842	251	445	3,266	7.3
15-24 years	1,840	8,135	1,074	584	4,421	7.6
25-34 years	5,115	26,774	3,372	659	5,234	7.9
35-44 years	5,621	35,698	3,866	688	6,351	9.2
45-54 years	3,956	25,642	2,689	680	6,482	9.5
55-64 years	2,349	14,659	1,635	696	6,241	9.0
65 years and over	436	2,505	299	686	5,745	8.4

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1987

Persons who received a transplant prior to 1987, with graft failure in 1987

Utilization for the final group of ESRD beneficiaries, those persons who received a kidney transplant before 1987 and experienced a graft failure in 1987, is shown in Table 39. There were 1,335 of these persons, representing 1.1 percent of all Medicare ESRD beneficiaries who used benefits for at least part of the year. Those beneficiaries 24 years of age or younger comprised 17.5 percent of this population; those from ages 25 to 54 comprised 74.6 percent; while those 55 years of age or older comprised only 7.9 percent of this population. The 1,335 persons in this group had 3,641 hospitalizations and were hospitalized for a total of 32,691 days. This resulted in a discharge rate of 2,727 discharges per 1,000 beneficiaries and a days of care rate of 24,488 days per 1,000 beneficiaries. There was a direct and positive

relationship between age and inpatient use. There was a modest effect of age on hospitalization, mostly due to longer lengths of stay in the older age groups.

A comparison of these four tables shows that the dialysis population is the oldest of the four groups. Over 60 percent of the dialysis patients are 55 years of age or older, compared to a range of 8 percent to 14 percent in the other three groups. With only 663 discharges per 1,000 patients, persons with a functioning graft experienced significantly fewer hospital stays than the other three groups, which ranged from 1,341 discharges per 1,000 for dialysis patients to 2,727 discharges per 1,000 for patients whose grafts failed. The average length of stay was relatively stable across groups at about 9 days, with the exception of transplant patients for whom the average length of stay was a little longer at about 12 days. The longer average length of stay for transplant patients is attributable to the transplant stay itself.

Table 39
Discharge rates for Medicare kidney graft failure patients, by days of care rates, average length of stay, and age: 1987

Age	Number of patients	Number of inpatient days	Number of inpatient discharges	Discharges per 1,000 person	Days per 1,000 persons	Average length of stay
Total	1,335	32,691	3,641	2,727	24,488	9.0
Under 15 years	51	1,071	110	2,157	21,000	9.7
15-24 years	183	3,646	455	2,486	19,923	8.0
25-34 years	377	9,558	1,047	2,777	25,353	9.1
35-44 years	387	8,967	1,099	2,840	23,171	8.2
45-54 years	232	6,434	643	2,772	27,733	10.0
55-64 years	90	2,659	243	2,700	29,544	10.9
65 years and over	15	356	44	2,933	23,733	8.1

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, May 1989 update, 1987.

Program expenditures

Data

Expenditures for this section were obtained from the Medicare Automated Data Retrieval System (MADRS) at HCFA. MADRS is a system for linking 100 percent of each beneficiary's Part A and Part B expenditure records for each calendar year. Persons identified as ESRD beneficiaries from the ESRD Program Management and Medical Information System (PMMIS) were linked with MADRS for this analysis. At the time of this data report, complete data were available for the years 1984 through 1987.

Program expenditures include payments for all medical services for which Medicare beneficiaries are eligible. These services include inpatient hospital care, outpatient services (mostly dialysis), physician services, skilled nursing care, and home health care. Dialysis services, for the most part, are paid for under the composite rate methodology, which was approximately \$127 per dialysis session for the years included in this section. Because outpatient dialysis is a Part B service, Medicare pays 80 percent of the composite rate with the beneficiary or other third party payer responsible for the remaining 20 percent. About 7,000 of the over-18,000 patients who dialyze at home select Method II for billing of dialysis services. Under Method II, they may obtain dialysis supplies directly from the supplier and then may bill the Medicare carrier directly for those dialysis supplies. Dialysis expenditures for these persons will appear in the physician/supplier section. Under the Method I option, home dialysis supplies are obtained through the dialysis facilities which, in turn, bill the Medicare intermediary at the same composite rate as they bill for in-center dialysis.

Physician care, which is deemed to be part of the routine care of dialysis patients, is paid for on a capitation basis. From 1984 to 1986, the average amount for this physician care was \$188 per month; since 1986, the average rate has been \$173 per month. In addition, there are physician expenditures for nondialysis related care. Hospital care is paid for under the prospective payment system instituted by Medicare in October 1983. Under this system, Medicare pays a predetermined amount per hospital stay, depending on the diagnosis and/or procedure associated with the stay. For each hospital episode, lasting until there is a 90-day break between stays, the patient is responsible for a deductible, roughly equivalent to 1 day of a hospital stay. This amount was \$356 in 1984; by 1987, it had risen to \$520.

Much of the Part B data in MADRS is aggregated to the calendar year level. Therefore, it was not possible to link expenditures with time intervals shorter than a calendar year. This presents a particular problem for the ESRD population because of the high turnover rate among patients. Each year a large percentage of patients have only a partial year of Medicare coverage due to the high rate of new patients entering the program and the high mortality rate. The descriptive tables shown in this section are based on all ESRD patients ever enrolled during each of the years 1984 through 1987. It is

important to remember that, for many patients, their expenditure experience represents less than an entire year's experience.

Another qualification on these expenditure data concerns the provisions of Medicare as a secondary payer. Beginning in 1981, Medicare became the secondary payer for care for ESRD patients in their first year of Medicare coverage, if they have another insurance carrier and if they are entitled to Medicare solely because of ESRD (i.e., not because of disability and not because they are age 65 or over). The extent of coverage of, and payment for, services by other payers is not well known because Medicare may not receive copies of bills for these services. Because of this problem, Tables 41 through 45 are based only on patients who have had Medicare coverage for at least 1 year prior to January 1, 1987.

Patients have been grouped in these tables according to four basic treatment categories, as in the chapter on hospitalization. These mutually exclusive and exhaustive groups are: (1) patients on dialysis during their entire coverage period within the observation year; (2) patients receiving a transplant during their coverage period during the observation year; (3) patients receiving a transplant prior to the observation year and maintaining a functioning graft throughout the observation year; and (4) patients receiving a transplant prior to the observation year but whose graft failed during the observation year.

Results

Medicare program expenditures for the years 1984 through 1987 by patient treatment group and by type of service are shown in Table 40. Total expenditures increased from \$2,333 million in 1984 to \$3,315 million in 1987, an average annual increase of 12.4 percent. The number of persons ever enrolled during each year increased from 112,590 in 1984 to 147,850 in 1987, an average annual increase of 9.5 percent. Dialysis accounted for both the majority of patients and the bulk of program expenditures. In 1984, dialysis patients accounted for 83.0 percent of all patients and 85.0 percent of all program expenditures. By 1987, dialysis patients accounted for 78.6 percent of all patients and 83.5 percent of all program expenditures.

The next largest group, in terms of program expenditures, was persons receiving kidney transplants. In most years, they accounted for about 5.5 percent of all patients and 10.5 percent of program expenditures. Persons with a functioning graft were the fastest growing group of patients during this time period (see Incidence and Enrollment chapter). This group increased at an average annual rate of 22.6 percent (11,931 in 1984 and 21,966 in 1987). As a result, they increased as a percent of the total Medicare enrollment from 10.6 percent in 1984 to 14.9 percent in 1987. However, due to the fact that these patients are not on maintenance dialysis and that they are beyond the transplant year costs, they accounted for only 3.1 percent of program expenditures in 1984, increasing to 4.3 percent in 1987. Finally, previously

transplanted patients experiencing a graft failure account for only 1 percent of patients and about 1.5 percent of program expenditures.

In 1987, 44 percent of program expenditures (\$1,462 million) were accounted for by inpatient hospital stays. Outpatient billings (most of which are for maintenance dialysis) accounted for 35 percent of program expenditures (\$1,165 million). Physician/supplier billings (which include some home dialysis expenditures) accounted for 20 percent of expenditures (\$672 million) and the remaining 1 percent was due to skilled nursing facility and home health care use (\$17 million).

The distribution of expenditures by type of service varied greatly by treatment category. For dialysis patients, expenditures were equally split between inpatient and outpatient categories at 39 percent, with an additional 21 percent due to physician/supplier billings. The other treatment categories were more heavily weighted toward inpatient stays. Inpatient stays accounted for 70 percent of the costs of transplant patients, 65 percent of the costs of functioning graft patients, and 59 percent of the costs of patients experiencing a graft failure.

The annual expenditure data expressed in terms of expenditures per enrolled person is shown in Table 41. Overall, Medicare expenditures per enrolled ESRD beneficiary increased from \$22,098 in 1984 to \$24,133 in 1987, an average annual increase of 3.0 percent. For dialysis patients, expenditures in 1984 and 1987 were \$23,405 and \$26,573, respectively. The increase in expenditures for dialysis patients was due mostly to increases in inpatient expenditures (6.0 percent average annual increase) and physician/supplier expenditures (8.7 average percent annual increase). Per capita expenditures for dialysis, represented by outpatient billings, remained essentially unchanged during this 4-year period. Per capita expenditures for transplant recipients increased from \$46,930 in 1984 to \$56,791 in 1986. The expenditures then declined to \$56,007 in 1987, representing a net annual increase of 6.1 percent. Inpatient and physician/supplier expenditures increased by similar rates. Outpatient expenditures, mainly representing dialysis costs prior to the transplant and dialysis costs for failed grafts, remained relatively constant during this 4-year period.

Per capita expenditures are lowest for patients with a functioning graft. In 1984, expenditures for this group were \$5,983, increasing to \$6,416 by 1987, an average annual increase of 2.4 percent. Inpatient expenditures remained unchanged for this group during this period. Physician/supplier costs increased at an annual rate of 8.8 percent, from \$1,097 in 1984 to \$1,412 in 1987. Patients experiencing a graft failure had expenditures of \$32,823 in 1984 and \$35,662 in 1987, an average annual increase of 2.8 percent. As with transplant recipients, the increases were about the same for inpatient services (4.3 percent per year) and physician/supplier services (3.5 percent per year).

Tables 42, 43, 44, and 45 show per capita expenditures by age, sex, race, and primary cause of renal failure for the four treatment groups: dialysis, transplant, functioning graft, and graft failure, respectively. The tables also

show, in the parentheses, the average number of days of Medicare coverage for each subgroup (males, females, age groups, etc.). Average days of coverage tended to be much lower for dialysis patients than for the other three patient groups. In addition, due to higher mortality rates, days of coverage decreased markedly with age. Unadjusted per capita payments among dialysis patients tend to underestimate the relative payment amounts for this group; therefore, Table 42 includes an additional column representing an annualized per capita payment estimate. This annualized estimate is a linear extrapolation of the basic per capita payments to a full year (365 days) of Medicare coverage.

Expenditures for dialysis patients (Table 42) increased moderately with age, from a low of \$25,115 for persons 25 to 34 years of age to \$27,969 for persons 75 years of age and over. However, this understates the relative costs because the average number of days of coverage decrease with age due to higher mortality rates. For instance, persons in the youngest two age groups averaged 353 days of coverage in 1987 while persons 75 years of age and older averaged 256 days of coverage. When the expenditures are annualized, age effects become more evident. Estimated annual per capita expenditures range from a low of \$26,581 among persons 15 to 24 years of age to a high of \$39,878 among persons 75 years of age and older—a 50 percent differential. Female beneficiaries had higher average expenditures than did male beneficiaries (\$27,698 and \$25,511, respectively) with higher levels in all four service categories. Among racial groups, expenditures ranged from a low of \$26,474 for white persons to a high of \$27,589 among American Indians. However, on an annualized basis, per capita expenditures were virtually identical for Asian, white, and American Indian beneficiaries, at about \$33,300. Annualized per capita expenditures were just slightly lower for black persons, at \$31,719. Persons whose renal failure was attributed to diabetic nephropathy had the highest expenditure level (\$30,029), primarily due to higher rates of inpatient service use, followed by persons whose renal failure was attributed to hypertensive nephropathy (\$27,790). On an annualized basis, diabetic nephropathy patient expenditures were over \$40,000 and hypertensive patient expenditures were about \$35,000. Persons with glomerulonephritis and polycystic kidney disease had annualized expenditure amounts of about \$30,000.

Expenditures for transplant recipients (Table 43) were relatively constant across age groups, ranging from about \$54,700 to about \$56,700. The exception was persons under 15 years of age for whom per capita expenditures were \$59,743, or \$3,000 higher than any other age group. Female beneficiaries had slightly higher expenditure levels (\$56,226) than did male beneficiaries (\$55,861). White transplant recipients had the lowest (\$55,305) and black transplant recipients had the highest (\$57,852) per capita expenditures. The higher expenditure totals among black persons may be due, in part, to higher graft failure rates among black transplant recipients. Among diagnostic categories, persons whose renal failure was attributed to diabetes had the highest average expenditures (\$61,082),

and the lowest average expenditures were among persons whose renal failure was attributed to glomerulonephritis (\$54,575) and polycystic kidney disease (\$54,362).

Average expenditures for functioning graft patients (Table 44) ranged, by age, from a low of \$4,993 for persons 0 to 14 years of age to \$8,249 for persons 65 to 74 years of age. There was little difference in expenditures between male and female beneficiaries. Black beneficiaries had the highest average expenditures (\$7,902), followed by American Indian (\$6,579), white (\$6,164), and Asian (\$4,861) beneficiaries.

Persons whose renal failure was attributed to diabetic nephropathy had average expenditures which were about twice as great (\$11,126) as persons whose renal failure was attributed to either glomerulonephritis (\$4,935),

polycystic kidney disease (\$5,658), or other causes (\$5,780). Persons whose renal failure was attributed to hypertension had the second highest average expenditures (\$6,559).

Among graft failure patients (Table 45), per capita expenditures tended to increase with age from \$33,618 for persons 15 to 24 years of age to \$36,801 for persons 55 to 64 years of age. Female beneficiaries had average expenditures which were almost \$3,200 greater than male beneficiaries (\$37,613 and \$34,433, respectively). There were no differences in expenditures by race. Among diagnostic groups, the highest expenditures were for persons whose renal failure was attributed to diabetic nephropathy (\$42,926), with other groups ranging between between \$33,000 and \$37,000.

Table 40
Medicare end stage renal disease program expenditures
by patient treatment group: 1984-87

Treatment group	1984	1985	1986	1987	Average annual percent change
Expenditures in millions					
Total					
Number of patients	112,590	124,547	136,216	147,850	9.5
Expenditures					
Total	\$2,332.6	\$2,628.7	\$3,047.6	\$3,315.4	12.4
Inpatient	986.1	1,166.6	1,377.4	1,461.8	14.0
Outpatient	915.6	956.3	1,074.9	1,165.4	8.4
Physician/supplier	419.3	491.2	579.3	671.7	17.0
Other ¹	11.6	14.7	15.9	16.7	12.9
Dialysis					
Number of patients	93,419	101,665	108,688	116,172	7.5
Expenditures					
Total	\$1,983.7	\$2,205.6	\$2,518.1	\$2,768.7	11.8
Inpatient	748.7	868.3	1,002.9	1,091.1	13.4
Outpatient	860.9	897.9	1,003.6	1,086.8	8.1
Physician/supplier	363.5	426.0	497.5	576.2	16.6
Other ¹	10.6	13.4	14.0	14.5	11.2
Transplant					
Number of patients	6,213	6,980	8,269	8,220	9.8
Expenditures					
Total	\$242.8	\$298.4	\$371.4	\$352.6	13.2
Inpatient	167.2	215.5	269.9	247.4	13.9
Outpatient	38.2	40.3	49.0	49.7	9.1
Physician/supplier	37.1	42.2	51.9	55.0	14.0
Other ¹	0.3	0.4	0.6	0.6	26.6
Functioning graft					
Number of patients	11,931	14,805	18,054	21,966	22.6
Expenditures					
Total	\$72.5	\$89.7	\$118.1	\$141.7	25.0
Inpatient	51.1	62.5	81.2	92.5	21.8
Outpatient	7.7	9.3	12.7	16.6	29.1
Physician/supplier	13.1	17.1	23.2	31.2	33.7
Other ¹	0.6	0.8	1.1	1.4	34.2
Graft failure					
Number of patients	1,027	1,097	1,205	1,492	13.3
Expenditures					
Total	\$33.6	\$35.0	\$40.1	\$52.4	15.9
Inpatient	19.1	20.3	23.5	30.8	17.3
Outpatient	8.7	8.7	9.6	12.2	12.0
Physician/supplier	5.7	5.9	6.8	9.2	17.3
Other ¹	0.1	0.1	0.2	0.1	7.9

¹Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, May 1989 update, 1984-87.

Table 41
Medicare end stage renal disease program expenditures per patient
by patient treatment group (no Medicare secondary payer): 1984-87

Treatment groups (no Medicare secondary payer)	1984	1985	1986	1987	Average annual percent change
Expenditures in millions					
Total					
Number of patients	84,551	93,925	102,857	111,694	9.7
Expenditures (per patient)	\$22,098	\$22,447	\$23,866	\$24,133	3.0
Total	9,044	9,586	10,450	10,397	4.8
Inpatient	8,942	8,487	8,709	8,709	-0.9
Outpatient	3,995	4,243	4,577	4,901	7.1
Physician/supplier	117	132	130	126	2.5
Other ²					
Dialysis					
Number of patients	69,984	76,320	81,585	86,976	7.5
Expenditures (per patient)					
Total	23,405	23,905	25,628	26,573	4.3
Inpatient	8,735	9,235	10,079	10,401	6.0
Outpatient	10,251	9,888	10,344	10,523	0.9
Physician/supplier	4,289	4,631	5,060	5,508	8.7
Other ²	130	148	145	141	2.7
Transplant					
Number of patients	2,925	3,297	3,914	3,795	9.1
Expenditures (per patient)					
Total	46,930	52,237	56,791	56,007	6.1
Inpatient	31,421	36,840	40,570	38,844	7.3
Outpatient	8,313	8,014	8,224	8,458	0.6
Physician/supplier	7,140	7,399	7,898	8,603	6.4
Other ²	56	74	98	102	22.1
Functioning graft					
Number of patients	10,765	13,351	16,309	19,638	22.2
Expenditures (per patient)					
Total	5,983	6,040	6,500	6,416	2.4
Inpatient	4,206	4,206	4,461	4,196	-0.1
Outpatient	631	620	693	744	5.6
Physician/supplier	1,097	1,158	1,287	1,412	8.8
Other ²	49	55	60	64	9.3
Graft failure					
Number of patients	877	957	1,049	1,285	13.6
Expenditures (per patient)					
Total	32,823	32,303	34,008	35,662	2.8
Inpatient	18,438	18,695	20,055	20,903	4.3
Outpatient	8,639	8,092	8,012	8,410	-0.9
Physician/supplier	5,636	5,442	5,785	6,250	3.5
Other ²	110	73	156	100	-3.1

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Other includes skilled nursing facility and home health services.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, May 1989 update, 1984-87.

Table 42
**Medicare end stage renal disease program expenditures, by age, sex, race,
and primary diagnosis: 1987 dialysis patients (no Medicare secondary payer)¹**

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person					
		Inpatient	Outpatient	Physician/supplier	Other	Total	Annualized
Total	86,976 (299)	\$10,401	\$10,523	\$5,508	\$141	\$26,573	\$32,439
Age							
Under 15 years	307 (353)	10,301	9,334	6,487	41	26,163	27,052
15 - 24 years	1,628 (353)	8,763	12,068	4,850	26	25,707	26,581
25 - 34 years	5,317 (344)	8,332	12,003	4,736	44	25,115	26,648
35 - 44 years	8,345 (340)	8,450	11,982	4,935	57	25,423	27,292
45 - 54 years	10,574 (332)	8,370	11,924	5,076	85	25,456	27,986
55 - 64 years	17,687 (316)	9,434	11,362	5,302	123	26,221	30,287
65 - 74 years	28,529 (274)	11,630	9,547	5,793	183	27,152	36,170
75 years or over	14,589 (256)	12,697	8,878	6,174	221	27,969	39,878
Sex							
Male	44,752 (297)	9,983	10,116	5,291	120	25,511	31,352
Female	42,224 (301)	10,844	10,954	5,737	163	27,698	33,587
Race							
Asian	1,027 (297)	9,011	12,503	5,507	95	27,116	33,324
Black	28,186 (313)	10,355	11,484	5,229	133	27,200	31,719
White	55,199 (290)	10,574	10,031	5,720	150	26,474	33,321
American Indian	669 (302)	11,440	11,366	4,688	95	27,589	33,344
Other/unknown	1,895 (330)	6,443	9,194	3,768	51	19,455	21,518
Diagnosis							
Diabetes	16,865 (271)	13,215	10,053	6,495	266	30,029	40,445
Glomerulonephritis	17,728 (312)	9,514	11,417	5,333	99	26,363	30,841
Hypertension	22,530 (284)	11,374	10,520	5,753	143	27,790	35,716
Polycystic kidney disease	3,903 (329)	8,067	12,680	5,341	69	26,157	29,019
Other	8,338 (298)	10,870	10,333	5,608	127	26,938	32,995
Unknown	17,612 (325)	7,650	9,689	4,413	83	21,835	24,522

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, May 1989 update, 1984-87.

Table 43
**Medicare end stage renal disease program expenditures, by age, sex, race,
and primary diagnosis: 1987 transplant patients (no Medicare secondary payer)**

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				
		Inpatient	Outpatient	Physician/supplier	Other	Total
Total	3,765 (351)	\$38,844	\$8,458	\$8,603	\$102	\$56,007
Age						
Under 15 years	128 (354)	43,305	7,528	8,860	50	59,743
15 - 24 years	342 (355)	40,443	8,163	8,115	18	56,739
25 - 34 years	809 (352)	38,910	8,497	8,426	68	55,901
35 - 44 years	1,016 (352)	39,283	8,544	8,500	84	56,412
45 - 54 years	836 (352)	37,281	8,640	8,688	116	54,726
55 - 64 years	498 (345)	38,424	8,409	9,020	214	56,067
65 - 74 years	162 (336)	38,747	8,458	9,329	178	56,711
75 years or over	4	—	—	—	—	—
Sex						
Male	2,279 (350)	38,936	8,333	8,510	82	55,861
Female	1,516 (353)	38,706	8,645	8,743	132	56,226
Race						
Asian	85 (357)	40,137	9,413	7,177	29	56,757
Black	987 (354)	41,023	8,434	8,275	121	57,852
White	2,667 (349)	37,967	8,438	8,805	95	55,305
American Indian	36 (360)	39,253	9,453	6,516	258	55,480
Other/unknown	20	—	—	—	—	—
Diagnosis						
Diabetes	500 (342)	42,344	8,513	10,008	216	61,082
Glomerulonephritis	1,254 (355)	37,719	8,551	8,253	52	54,575
Hypertension	587 (354)	39,356	8,416	8,109	95	55,977
Polycystic kidney disease	322 (353)	36,759	8,873	8,693	37	54,362
Other	481 (355)	39,403	8,657	8,645	132	56,837
Unknown	651 (343)	38,480	7,922	8,568	124	55,094

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System; May 1989 update, 1984-87

Table 44
**Medicare end stage renal disease program expenditures, by age, sex, race,
and primary diagnosis: 1987 functioning graft patients (no Medicare secondary payer)¹**

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				
		Inpatient	Outpatient	Physician/ supplier	Other	Total
Total	19,638 (348)	\$4,196	\$744	\$1,412	\$64	\$6,416
Age						
Under 15 years	509 (340)	3,216	864	902	10	4,993
15 - 24 years	1,732 (345)	3,368	751	972	7	5,099
25 - 34 years	4,947 (351)	3,729	677	1,188	49	5,643
35 - 44 years	5,537 (350)	4,260	714	1,415	75	6,463
45 - 54 years	4,000 (347)	4,740	805	1,660	74	7,279
55 - 64 years	2,406 (346)	4,714	804	1,759	85	7,362
65 - 74 years	481 (350)	5,238	852	1,990	169	8,249
75 years or over	26	—	—	—	—	—
Sex						
Male	12,310 (348)	4,246	733	1,410	57	6,446
Female	7,328 (348)	4,112	764	1,415	76	6,366
Race						
Asian	313 (350)	3,012	620	1,218	10	4,861
Black	3,442 (349)	5,442	881	1,512	67	7,902
White	15,475 (348)	3,972	722	1,405	64	6,164
American Indian	165 (338)	4,568	766	1,153	92	6,579
Other/unknown	243 (353)	2,054	377	816	48	3,295
Diagnosis						
Diabetes	3,075 (349)	7,590	950	2,361	225	11,126
Glomerulonephritis	6,165 (349)	3,092	697	1,126	20	4,935
Hypertension	2,031 (352)	4,197	843	1,477	43	6,559
Polycystic kidney disease	1,166 (346)	3,480	798	1,352	29	5,658
Other	2,268 (344)	3,802	766	1,186	26	5,780
Unknown	4,933 (349)	3,811	612	1,268	53	5,744

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, May 1989 update, 1984-87.

Table 45
**Medicare end stage renal disease program expenditures, by age, sex, race,
and primary diagnosis: 1987 graft failure patients (no Medicare secondary payer)¹**

Age, sex, race, and primary diagnosis	Number of persons ²	Expenditures per person				
		Inpatient	Outpatient	Physician/ supplier	Other	
Total	1,285 (330)	\$20,903	\$8,410	\$6,250	\$100	\$35,662
Age						
Under 15 years	36 (346)	25,102	7,366	9,263	6	41,737
15 - 24 years	176 (337)	19,536	8,633	5,432	16	33,618
25-34 years	350 (333)	20,130	8,449	6,123	67	34,769
35 - 44 years	371 (334)	20,644	8,608	6,222	142	35,616
45 - 54 years	239 (322)	21,918	8,112	6,574	141	36,745
55 - 64 years	96 (300)	21,428	7,807	6,419	147	36,801
65 - 74 years	17	—	—	—	—	—
75 years or over	1	—	—	—	—	—
Sex						
Male	788 (331)	20,018	8,209	6,148	58	34,433
Female	497 (328)	22,306	8,728	6,412	167	37,613
Race						
Asian	22	—	—	—	—	—
Black	449 (341)	20,526	8,910	6,129	110	35,676
White	802 (324)	20,999	8,231	6,286	97	35,613
American Indian	11	—	—	—	—	—
Other/unknown	1	—	—	—	—	—
Diagnosis						
Diabetes	182 (323)	26,492	8,251	7,846	337	42,926
Glomerulonephritis	413 (332)	20,618	8,108	5,947	61	34,735
Hypertension	233 (331)	19,082	8,602	5,914	82	33,680
Polycystic kidney disease	60 (334)	20,701	9,882	5,147	77	35,807
Other	183 (330)	21,538	8,408	6,423	29	36,398
Unknown	214 (329)	18,193	8,505	6,006	60	32,764

¹Expenditures were calculated only for persons who had at least one full year of Medicare entitlement prior to the observation year. Thus, any patients for whom Medicare was a secondary payer were not included.

²Average number of days of Medicare coverage shown in parentheses.

NOTE: Rates based on fewer than 30 observations are not displayed.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, and the Medicare Automated Data Retrieval System, May 1989 update, 1984-87.

Providers of renal care

This section discusses the growth in the number of participating renal providers furnishing some form of service to end stage renal disease (ESRD) patients. For the purpose of this report, the following definitions apply. "Dialysis facility" refers to all providers approved by Medicare to furnish at least one type of dialysis service. A "dialysis center" is a hospital-based unit which, in addition to providing dialysis service(s), is also approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services. The term "transplant center" includes all hospitals approved to do kidney transplants. The term "renal provider" encompasses all of the units described above.

Growth in numbers and types of renal providers

Since the Medicare ESRD program began in 1973, the total number of Medicare-approved renal providers has tripled from 606 in 1973 to 1,819 in December 1988 (Figure 1). However, since 1985, the increase in total numbers of renal providers has remained relatively constant at about 7 percent annually. Rates of increase calculated from the data in Table 46 show that the increase was 6.9 percent in 1988; it was 7.8 percent in 1987; and it was 7.9 percent in 1986. Data from prior reports show that the increase was 6.9 percent in 1985.

The specific increase in the number of dialysis facilities has been primarily among freestanding facilities; i.e., facilities not affiliated with hospitals. In 1973, there were only about 68 freestanding facilities, which represented about 11 percent of the total number of Medicare-approved dialysis facilities in operation at that time. At the end of 1988, there were 1,066 freestanding dialysis facilities, which represented about 58.6 percent of the total. Again, however, the rate of increase has leveled over the last 4 years. Rates of increase for freestanding dialysis facilities calculated from the data in Table 46 show that the increase was 11 percent in 1988; it was 11.5 percent in 1987; and it was 15.1 percent in 1986. Data from previous reports show that the increase in 1985 was 12 percent.

Table 46 also shows that, in 1988, renal providers were split evenly between proprietary and nonprofit (49.9 and 50.1 percent, respectively). The clear trend is that, while the number of providers in both groups is

increasing each year, the proprietary organizations are increasing at a much faster rate.

Specifically, from 1987 to 1988, the number of proprietary renal providers increased 12.6 percent over 1987, but the number of nonprofit organizations increased only 1.8 percent for the same period. Examination of prior years' data confirms this trend.

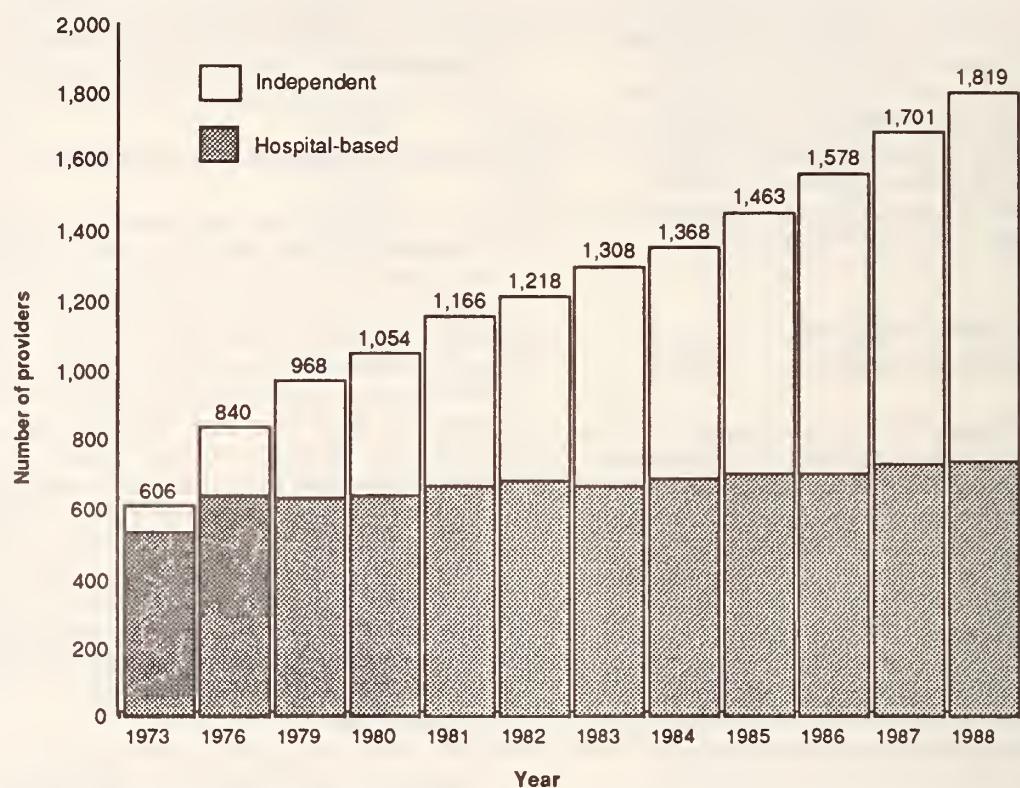
Type of renal care provided

In 1988, 8,932 renal transplants were performed in Medicare-approved transplant centers. ESRD patients who do not receive kidney transplants receive dialysis care either at home or at one of the 1,734 dialysis facilities. These facilities may be in either a hospital setting (of which there were 158 dialysis facilities and 510 dialysis centers at the end of 1988) or a nonhospital setting (of which there were 1,066 at the end of 1988). As stated in footnotes to Tables 47 and 48, the categories will not add across to the total because some renal providers have both a transplant center and a dialysis facility. In fact, at the end of 1988, 161 of the 510 dialysis centers noted above were in hospitals that also had approved transplant centers. Finally, 44 other dialysis centers are defined as inpatient centers because they provide backup dialysis services only, and 20 percent or less of their dialysis service is provided on an outpatient basis.

Regional and State comparison—renal dialysis facilities and populations

The data in Table 47 show that freestanding outpatient dialysis facilities (1,066) account for about 61 percent of the total number of these facilities (1,734). However, the range by region varies between a low of 31.1 percent in the region served by HCFA's New York Regional Office to a high of 86.2 percent in the region served by HCFA's Atlanta Regional Office. These data also show that hospital-based dialysis facilities are growing at a slower rate than the freestanding. In fact, in two regions (Atlanta and Denver) there was no increase in hospital-based dialysis facilities and in one region (San Francisco) the number of hospital-based dialysis facilities actually decreased.

Figure 1
Medicare end stage renal disease providers, hospital-based versus free-standing:
Selected years, 1973-1988



SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1973-88.

Table 46
Number and percent of certified end stage renal disease providers,
by type of ownership: 1984-88

Type of ownership	1984		1985		1986		1987		1988	
	Number	Percent								
Total	1,368	100.0	1,463	100.0	1,578	100.0	1,701	100.0	1,819	100.0
Proprietary	552	40.4	616	42.1	715	45.3	805	47.3	907	49.9
Hospital-based	23	1.7	26	1.8	24	1.5	24	1.4	26	1.4
Freestanding	529	38.7	590	40.3	691	43.8	781	45.9	881	48.4
Nonprofit	816	59.6	847	57.9	863	54.7	896	52.7	912	50.1
Hospital-based	677	49.4	689	47.1	693	43.9	717	42.2	727	40.0
Freestanding	139	10.2	158	10.0	170	10.8	179	10.5	185	10.2

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, 1984-88.

Table 47
**Certified end stage renal disease providers of service, type of service,
and number of approved dialysis stations, by region: December 1988**

Region	Total providers of service ¹	Hospital transplant centers	Outpatient dialysis facilities			Inpatient hospital dialysis centers	Approved dialysis stations total	Facilities training in self-dialysis
			Total	Hospital	Freestanding			
All regions	1,819	202	1,734	668	1,066	44	22,605	1,191
Boston	65	13	63	40	23	0	734	55
New York	161	18	161	111	50	0	2,297	116
Philadelphia	228	22	220	82	138	8	2,834	159
Atlanta	413	25	399	55	344	9	5,520	219
Chicago	249	38	237	153	84	10	3,058	175
Dallas	266	32	249	74	175	3	3,399	158
Kansas City	84	17	74	40	34	7	867	72
Denver	51	6	49	30	19	0	451	31
San Francisco	261	25	245	63	182	6	3,060	182
Seattle	41	6	37	20	17	1	385	24

¹Categories do not add to total because some hospital transplant centers also provide outpatient services and are counted again in that category.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, December 1988.

Table 48
**Certified end stage renal disease providers of service,
and number of approved dialysis stations, by State: December 1988**

State	Total providers of service ¹	Hospital transplant centers	Outpatient dialysis facilities			Inpatient hospital dialysis centers	Approved dialysis stations total	Facilities training in self-dialysis
			Total	Hospital	Freestanding			
Total	1,819	202	1,734	668	1,066	44	22,605	1,191
Alabama	36	2	35	2	33	1	454	26
Alaska	3	0	2	0	2	1	15	1
Arizona	33	4	32	12	20	0	315	24
Arkansas	26	2	25	8	17	1	295	21
California	209	20	194	40	154	6	2,540	148
Colorado	16	3	15	5	10	0	189	11
Connecticut	17	2	17	14	3	0	184	17
Delaware	4	0	4	2	2	0	159	3
District of Columbia	16	5	16	8	8	0	197	8
Florida	124	4	118	18	100	6	1,676	71
Georgia	67	5	66	13	53	0	962	42
Hawaii	11	1	11	7	4	0	129	4
Idaho	6	0	6	5	1	0	51	3
Illinois	78	8	71	33	38	7	1,042	58
Indiana	30	2	30	20	10	0	349	21
Iowa	14	4	13	11	2	0	153	13
Kansas	15	2	12	1	11	2	183	12
Kentucky	21	3	20	7	13	0	210	12
Louisiana	61	6	58	10	48	0	703	33
Maine	5	1	5	3	2	0	56	5
Maryland	41	3	40	10	30	1	532	28
Massachusetts	31	9	29	18	11	0	331	23
Michigan	43	10	39	27	12	2	536	30
Minnesota	24	4	24	22	2	0	280	8
Mississippi	25	1	25	2	23	0	328	8

See footnote at end of table.

Table 48—Continued
**Certified end stage renal disease providers of service,
and number of approved dialysis stations, by State: December 1988**

State	Total providers of service ¹	Hospital transplant centers	Outpatient dialysis facilities			Inpatient hospital dialysis centers	Approved dialysis stations total	Facilities training in self-dialysis
			Total	Hospital	Freestanding			
Missouri	44	9	40	20	20	3	454	38
Montana	5	0	5	4	1	0	44	4
Nebraska	10	2	8	7	1	2	74	9
Nevada	4	0	4	2	2	0	57	4
New Hampshire	5	0	5	2	3	0	46	4
New Jersey	31	3	31	24	7	0	586	25
New Mexico	17	2	15	8	7	0	146	12
New York	110	13	110	77	33	0	1,405	82
North Carolina	45	5	45	8	37	0	757	22
North Dakota	7	0	7	7	0	0	53	4
Ohio	46	11	46	30	16	0	587	33
Oklahoma	27	6	26	20	6	0	229	11
Oregon	10	1	10	6	4	0	125	9
Pennsylvania	100	9	93	39	54	7	1,172	73
Puerto Rico	18	1	18	8	10	0	289	9
Rhode Island	6	0	6	2	4	0	103	5
South Carolina	42	1	41	1	40	1	520	13
South Dakota	9	0	9	9	0	0	49	3
Tennessee	53	4	49	4	45	1	613	25
Texas	136	16	126	28	98	2	2,032	82
Utah	13	3	12	5	7	0	109	8
Vermont	1	1	1	1	0	0	14	1
Virgin Islands	2	1	2	2	0	0	17	0
Virginia	53	3	53	16	37	0	637	37
Washington	22	5	19	9	10	0	194	11
West Virginia	14	2	14	7	7	0	137	10
Wisconsin	29	3	28	22	6	1	267	25
Wyoming	1	0	1	0	1	0	7	1
American Samoa	1	0	1	1	0	0	2	0
Guam	1	0	1	1	0	0	6	1
Mariana Islands	1	0	1	0	1	0	5	0

¹Categories do not add to total because some hospital transplant centers also provide outpatient services and are counted again in that category.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Program Management and Medical Information System, December 1988.

End stage renal disease studies

Centers for Disease Control survey

The Centers for Disease Control (CDC) annually surveys dialysis facilities using their Form 53.7, "National Surveillance of Dialysis - Associated Hepatitis and Other Diseases." The CDC form is mailed by the Health Care Financing Administration to Medicare dialysis facilities along with the HCFA-2744, End Stage Renal Disease Facility Survey. As CDC surveys are received, they are forwarded to CDC for appropriate analyses.

Following is an explanation of the contents of the report entitled, "National Surveillance of Dialysis-Associated Diseases in the United States, 1988."

National Surveillance of Dialysis-Associated Diseases in the United States, 1988

by Miriam J. Alter, Ph.D. and Martin S. Favero, Ph.D.

In conjunction with the annual facility survey performed by the Health Care Financing Administration (HCFA) for calendar year 1988, the Centers for Disease Control (CDC) distributed by mail a questionnaire to all 1,734 chronic hemodialysis centers licensed by HCFA. The reported incidence and prevalence of hepatitis B virus (HBV) infection among patients and staff was measured by using hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) as markers. Incidence was defined as the percentage of patients or staff present in the facility for at least 1 month in 1988 who became positive for HBsAg during 1988. Prevalence was defined as the percentage of patients or staff present in the facility during the first week of December 1988 who were positive for HBsAg or for anti-HBs. Estimates of the cumulative number of patients and staff members susceptible to HBV (eligible for hepatitis B vaccine) were obtained by subtracting the number of patients and staff members positive for HBsAg and anti-HBs reported in a similar survey performed in 1982 (prior to nationwide use of vaccine) from the total number of patients and staff members reported in 1988. Other data collected included:

- Management of HBsAg-positive patients.
- Frequency of HBsAg serologic screening.
- Use of hepatitis B vaccine.
- Incidence of non-A, non-B hepatitis among patients and staff.
- Occurrence of pyrogenic reactions and septicemia (number of reactions and their occurrence in clusters).
- Incidence and case fatality rate of dialysis dementia.
- Occurrence of new dialyzer syndrome.
- Use of bicarbonate or acetate dialysis.
- Number of patients on high flux dialysis.

- Practices associated with reuse of dialyzers, dialyzer caps, bloodlines, and transducer filters.
- Procedures for cleaning and disinfection.
- Number of patients undergoing chronic dialysis known to have human immunodeficiency virus (HIV) infection.

Questionnaires were returned by 1,586 centers, a response rate of 91 percent. These centers represented 107,804 patients and 28,501 staff members. All questionnaires were edited for accuracy and consistency of responses. When necessary, facilities were recontacted (approximately 750) for clarification of data. Data were analyzed with use of the chi square test and Fisher's exact test for differences in proportions. The Mantel-Haenszel combined odds ratio was used when adjustment of confounding variables was required. A *p* value less than .05 was considered significant.

Findings from the 1988 hepatitis survey showed that the incidence of HBV infection decreased by 93 percent among patients and by 96 percent among staff members, with the largest decline in both groups occurring between 1976 and 1980. Analysis of the survey data also showed that, from 1976 to 1983, a dramatic increase occurred in the percentage of centers that reported reuse of disposable dialyzers (18 percent to 52 percent). This percentage continued to increase and in 1988, 67 percent of the centers reported that they reused disposable dialyzers.

Please refer any questions or requests for this report to: Hepatitis Branch (Division of Viral Diseases), or Nosocomial Infections Laboratory Branch (Hospital Infections Program), Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

Health Care Financing Administration grant activity summaries

The Health Care Financing Administration is presently involved in many research activities that deal with or touch on the end stage renal disease program. These activities range from internal HCFA reviews to full-scope extramural studies that are covered under the grant or cooperative agreement process.

Summaries of these activities follow.

Capitation Payment System for All End Stage Renal Disease Services

Project No.: 95-C-98497/9-02
Period: January 1985-April 1988
Funding: \$ 424,426
Award: Cooperative Agreement
Awardee: El Camino Hospital District Corporation
2500 Grant Road
Mountain View, Calif. 94042
Project Officer: Bonnie M. Edington
Division of Health Systems and
Special Studies

Description: The purpose of this project was to develop and test the concept of a disease management organization under which capitation payments would cover all Medicare benefits for end stage renal disease (ESRD) patients.

Status: The project had 3 years of planning and development, and concluded when implementation proved to be infeasible. The awardee was unable to recruit the necessary number of providers to show that it would be cost effective to change the method of reimbursement under the Medicare program for ESRD patients. Without adequate support for the approach, as designed, it was decided not to proceed with the implementation of the demonstration. A final report is expected by Spring 1990.

Comparative Analysis of the Cost and Outcomes of Kidney Transplants

Project No.: 14-C-98564/0-03

Period: July 1984-December 1988

Funding: \$ 1,171,684

Award: Cooperative Agreement

Awardee: Battelle Human Affairs Research Centers
4000 NE. 41st Street
Seattle, Wash. 98105

Project Officer: Paul W. Eggers

Officer: Division of Beneficiary Studies

Description: This is an observational study of the impact of cyclosporine on renal transplantation.

Status: A sample of 396 patients from five major transplant centers were studied in depth. Detailed information on outcomes (mortality, complications, and disability) and cost were collected on this sample and were analyzed in terms of major prognostic factors. In addition, extensive data of a medical/biologic and of a sociological nature were obtained. The participating transplant centers were University of California, San Francisco; Ohio State University; University of Pittsburgh; University of Texas, Houston; and University of Wisconsin. The final report has been received.

Findings from the study are:

- Although cyclosporine is almost universally used in immunosuppressive therapy following cadaver kidney transplantation, there are two basic ways in which it is introduced. Under the "triple-drug" protocol, initial immunosuppression consists of azathioprine, prednisone, and antilymphocyte globulin, followed by cyclosporine about 1 week after transplant. Under the "double-drug" protocol, initial immunosuppression consists of cyclosporine and prednisone.
- Cyclosporine dosage was reduced for nearly all patients from initial hospital discharge through the first year post-transplant. For the triple-drug protocol, the cyclosporine dosage (mg/kg/day) was reduced from 8.9 at discharge to 3.5 at the end of the first year. For the double-drug protocol, the dosage was reduced from 14.1 to 4.9.

- The 1-year graft survival rates under the triple-drug regimen (89.2 percent) were significantly greater than under the double-drug regimen (71.6 percent). Other patient and donor characteristics were not significant.
- Episodes of renal dysfunction and adverse reactions were higher among the double-drug recipients than among the triple-drug recipients. However, rehospitalization rates did not differ between the two groups.
- Successful transplantation did not improve work status. Those who were working prior to transplantation tended to return to work. Those who were unemployed prior to transplantation tended to remain unemployed.
- Cause of renal failure had a major impact on work status, with diabetic patients having much lower employment levels than nondiabetic patients.
- Even though the patients in this study received their transplants prior to Medicare coverage of immunosuppression (1985 and 1986), almost all (97 percent) received assistance in paying for their drugs, most from private insurers.
- The average charge per transplant stay in this study was \$41,046, compared with \$33,000 for all kidney transplants in 1986.
- The 5-year immunosuppressive cost projections are lower than those suggested by published protocols. For the double-drug recipients, the study estimate was \$22,000 versus \$41,556 for the published protocols. For the triple-drugs recipients, the study estimate was \$16,527 versus \$44,698 for the published protocols.

The final report, "Comparative Analysis of the Cost and Outcomes of Kidney Transplants," is available from the National Technical Information Service, accession number PB90-126657.

Severity of Illness in End Stage Renal Disease Population in Northern Florida

Project No.: 14-C-98696/4-02

Period: September 1984-December 1988

Funding: \$ 509,356

Award: Cooperative Agreement

Awardee: University of Florida
Grinter Hall
Gainesville, Fla. 32610

Project Officer: Paul W. Eggers
Officer: Division of Beneficiary Studies

Description: The purpose of this study was to develop and test measures of severity of illness that predict resource consumption levels in the end stage renal disease population. These measures were based on the acute physiology and chronic health evaluation (APACHE) system.

Status: Measures of physiologic function, dialysis treatment variations, measures of comorbidities, and socioeconomic and behavioral factors were collected on a sample of 560 patients in 7 hemodialysis facilities. Scaling and weighting indexes were developed for both patient severity and resource consumption. The final

report has been completed and is expected to be available from the National Technical Information Service by mid-1990. Findings from the study are:

- The severity of illness instruments developed by this study predicted the outcomes of death, hospital days, and incremental resource consumption.
- There is no evidence that some facilities have a more severe case mix than other facilities.

End Stage Renal Disease Nutritional Therapy Study

Period: September 1984-August 1994
Award: Interagency Agreement
Agency: National Institutes of Health
National Institute of Diabetes and
Digestive and Kidney Disease
Bethesda, Md. 20892
Project Officer: Arne H. Anderson
Division of Health Systems and
Special Studies

Description: In accordance with the congressional mandate (Public Law 96-499), this study, known as the Modification of Diet in Renal Disease Study, is a multicenter cooperative clinical study designed to ascertain whether restriction of dietary protein and phosphorus and/or reduction of blood pressure well below the currently accepted target of 140/90 will reduce the rate of progression of chronic renal disease regardless of the nature of the primary underlying process. The study is being conducted jointly by the National Institutes of Health (NIH) and the Health Care Financing Administration (HCFA).

Status: Phase I, the developmental phase, began in September 1984 and concluded in December 1985. This phase produced a clinical protocol, forms manual, and operation manual. Phase II, a 2-year pilot study, began in January 1986 at nine clinical sites. Phase III, the full-scale clinical study, began in January 1989 at 15 clinical sites and is to run until December 31, 1992. At the conclusion of this phase, NIH will determine to what extent the dietary restrictions and blood pressure reduction result in a reduced rate of progression of chronic renal disease. HCFA is responsible for conducting the cost-effectiveness component of the study if the therapy is found to be effective. The following questions will be addressed in the cost analysis to be conducted by HCFA:

- Is nutritional therapy cost effective in the treatment of patients in the study?
- Is nutritional therapy less costly to HCFA than the current payment for dialysis and transplantation?
- Is nutritional therapy under HCFA administratively feasible?
- Can the therapy be effectively managed?

Relative Effectiveness and Cost of Transplantation and Dialysis in End Stage Renal Disease

Project No.: 14-C-98372/5-04
Period: September 1983-April 1989
Funding: \$ 1,811,126
Award: Cooperative Agreement
Awardee: University of Michigan
Department of Epidemiology
109 Observatory Street
Ann Arbor, Mich. 48109
Project Officer: Carl E. Josephson
Division of Program Studies

Description: This study will perform a comprehensive assessment of the cost effectiveness of end stage renal disease (ESRD) treatment under different treatment modalities, an assessment of the impact of cyclosporine on transplant success, and a life-table analysis of risk factors for patient and graft survival. The study will use data from the Michigan Kidney Registry, supplemented by survey information and medical record abstractions. Because of the design of the study, it is anticipated that the project will demonstrate the utility of a longitudinal, patient-specific data system for policy decisionmaking at the Federal level.

Status: Results from the three major research areas of quality of life, survival, and cost-effectiveness and the auxiliary studies on the Michigan Kidney Registry, and ethnic differences in diabetic ESRD, recovery from ESRD, and aspects of mortality and preventing ESRD and its sequelae will be included in the final report.

Cause and Failure to Transplant Cadaveric Human Organs

Project No.: 17-C-98728/1-01
Period: August 1986-July 1989
Funding: \$ 699,740
Award: Cooperative Agreement
Awardee: Brandeis University
415 South Street
Waltham, Mass. 02254
Project Officer: Paul W. Eggers
Division of Beneficiary Studies

Description: This project will determine the reasons for the high rate of wastage of cadaveric kidneys in the United States and make recommendations to reduce this loss in the future.

Status: Instrument design and field testing have been completed. Organ procurement agencies have been selected and have agreed to participate in the study. Data collection began on January 1, 1988, and continued through December 31, 1988. At the end of the study, data were available on 3,503 kidneys with discard information on 181 kidneys. The final report is expected

in Spring 1990. Analyses of initial data show:

- An overall wastage rate of 5.5 percent.
- Reasons for failure to transplant were anatomical abnormalities, 33 percent; donor/organ pathologies, 21 percent; surgical complications, 16 percent; preservation/perfusion problems, 11 percent; and all other reasons, 19 percent.

Predictors of Cost and Success in Kidney and Heart Transplantation

Project No.: 17-C-99183/0-01

Period: June 1988-June 1990

Funding: \$ 200,000

Award: Cooperative Agreement

Awardee: Battelle Human Affairs Research Centers
4000 NE. 41st Street
Seattle, Wash. 98105

Project Officer: Lawrence E. Kucken
Division of Beneficiary Studies

Description: This project will examine the patient and organizational characteristics that determine successful kidney and heart transplantation outcomes. Using multivariate life-table methods, data from the Medicare program will be combined with information from surveys of transplant facilities to construct a model of transplant facility effectiveness.

Status: Data preparation activities are currently under way. Publicity materials have been developed for distribution to transplant centers. Forms for primary data collection are being drafted, and secondary data tapes have been requested. A meeting of the technical advisory panel was held in June 1989. This committee's input was used in the design of the transplant center survey materials.

Impact of Payment Changes on Medicare: Case of End Stage Renal Disease

Project No.: 17-C-99021/3-03

Period: June 1987-June 1990

Funding: \$ 510,000

Award: Cooperative Agreement

Awardee: The Urban Institute Health Policy Center
2100 M Street, NW.
Washington, D.C. 20037

Project Officer: Carl E. Josephson
Division of Program Studies

Description: This project is part of an ongoing effort to monitor several components of Medicare's end stage renal disease (ESRD) program. The major thrust of this project will be to measure the impact of two recent reductions in the composite payment rate on access to and quality of care provided to ESRD patients. Information for this study will be derived from summaries of medical care records and other supplementary sources for past patients in both hospital-based and freestanding dialysis centers. The initial effort will concentrate on an assessment of the impact of the \$12 reduction of the composite rate in 1983. This will

include analysis of morbidity and mortality associated with ESRD in concert with the study mandated by Congress. This aspect was specified in Section 9335(b)(2) of the Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509). As soon as the data become available, the same protocol will be followed to measure the impact of the additional \$2 composite rate reduction instituted in 1986. Another issue under study in this project is the impact of dialyzer reuse on patient mortality, morbidity, and kidney transplantation, which is part of the Health Care Financing Administration's ongoing interest in measuring and tracking ESRD patient outcomes.

Status: An interim report was received and included in a Report to Congress, "Impact of the Changes in the End Stage Renal Disease Composite Rate." The report is available from the Superintendent of Documents, U.S. Government Printing Office, stock number 017-060-00311-1. The cost is \$10 domestic; \$12.50 foreign. The awardee is in the process of re-estimating the impact of the 1983 and 1986 composite rate changes on mortality and morbidity with the data being current through 1988. Additionally, other papers and topics in preparation include: impact of shorter time conventional dialysis, racial differences in outcomes of kidney transplants, a 10-year followup on the impact of dialyzer reuse on patient mortality, and the effects of cyclosporine on living related-donor kidney grafts.

Estimating Cost of Training for Self-Dialysis

Project No.: 99-C-98526/1-05

Period: August 1988-February 1990

Funding: \$ 34,000

Award: Cooperative Agreement

Awardee: Brandeis University Research Center

Task: Carl E. Josephson

Leader: Division of Program Studies

Description: The objective of this project is to develop a plan of analysis to estimate the cost of training end stage renal disease (ESRD) patients in performing self-dialysis. The basic approach will use an estimation of cost functions using the cost data supplied to the Health Care Financing Administration (HCFA) as part of the annual cost report. Other data under consideration include those from the Medicare Management Information Systems and claims information made available to HCFA researchers.

Status: The ESRD facility cost-based data were keyed and the data set linked to the ESRD program utilization and reimbursement files. Brandeis is presently analyzing the data and specifying the cost functions. A final report is expected in early 1990.

End Stage Renal Disease Annual Research Report

Funding: Intramural

Project: Paul W. Eggers

Director: Division of Beneficiary Studies

Description: These annual reports are designed to produce a wide range of data and analyses regarding the end stage renal disease program. Much of the data in these reports emphasize trends and comparisons over time, making these reports standard reference sources illustrating changes in the nature of the Medicare end stage renal disease population and in the pattern of treatment of this population.

Status: Published reports are:

- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1984*. HCFA Pub. No. 03221. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, July 1986.
- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1985*. HCFA Pub. No. 03274. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, September 1987.

- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1986*. HCFA Pub. No. 03268. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, December 1988.
- Health Care Financing Administration: *Research Report: End Stage Renal Disease, 1987*. HCFA Pub. No. 03288. Bureau of Data Management and Strategy. Washington. U.S. Government Printing Office, September 1989.

Complimentary copies of these reports, while supplies last, are available from the Health Care Financing Administration, Bureau of Data Management and Strategy, Office of Statistics and Data Management, Division of Information Analysis, Third Floor, Security Office Park Building, 6325 Security Boulevard, Baltimore, Maryland 21207. Telephone requests can be made to (301) 597-3933.

Appendix A

Glossary of terms

Access device - A piece of equipment or a mechanism designed to provide access to the patient's bloodstream (for hemodialysis) or to the peritoneal membrane (for peritoneal dialysis).

Agreement - A written document executed between an ESRD facility and another facility in which the other facility agrees to assume responsibility for furnishing specified services to patients and for obtaining reimbursement for those services.

Arrangement - A written document executed between an ESRD facility and another facility in which the other facility agrees to furnish specified services to patients but the ESRD facility retains responsibility for those services and for obtaining reimbursement for them.

Backup dialysis - A dialysis session furnished to an ESRD patient which is outside the patient's routine dialysis setting; e.g., a home patient dialyzing in the facility or an in-facility patient transferred to a backup facility.

Backup hospital - A hospital with which a dialysis facility has a written agreement under which inpatient hospital care or other hospital services are available promptly to the dialysis facility's patients when needed.

Cadaveric transplant - The surgical procedure of excising a kidney from a cadaver and implanting it into the patient.

Centers by number of transplants - Centers performing a specified number of transplants for the survey period.

Chronic maintenance dialysis - Dialysis regularly furnished to an ESRD patient in either a hospital-based, independent (non-hospital based), or home setting.

Continuous ambulatory peritoneal dialysis (CAPD) - A type of peritoneal dialysis in which the patient dialyzes at home, using special supplies, but without the need for a dialysis machine.

Continuous cycling peritoneal dialysis (CCPD) - A variant of CAPD in which a machine is used at home to make exchanges at night automatically.

Dialysis - A process of maintaining the chemical balance of the blood when the kidneys have failed; specifically, a process by which dissolved substances are removed from the patient's body by diffusion from one fluid compartment to another across a semi-permeable membrane. The types of dialysis currently used are hemodialysis, intermittent peritoneal dialysis (IPD), continuous ambulatory peritoneal dialysis (CAPD), and continuous cycling peritoneal dialysis (CCPD).

Dialysis center - A hospital unit which is approved to furnish the full spectrum of diagnostic, therapeutic, and rehabilitative services required for the care of ESRD dialysis patients (including inpatient dialysis but excluding transplantation). Services may be furnished directly or under arrangement with another approved provider.

Dialysis facility - A unit (hospital-based or freestanding) which is approved to furnish dialysis service(s) directly to ESRD patients.

Dialysis station - The treatment area which is designed and equipped to provide adequate and safe dialysis therapy, as well as privacy and comfort for patients.

Dialysis treatment - One session of dialysis, either in a dialysis facility or at home.

Dialysis treatments given (other than home) - The times dialysis machines were used in a dialysis facility to provide patient treatments.

Disposition of cadaveric kidneys - The final disposition of acquired cadaveric kidneys (e.g., transplanted, used for research, or discarded).

End stage renal disease (ESRD) - That stage of renal impairment which is irreversible and permanent and requires dialysis or kidney transplantation to ameliorate uremic symptoms and maintain life.

ESRD facility - See dialysis facility.

ESRD network - An approved organized group of ESRD providers in a designated area which, by their type and location and because of local referral patterns, collectively furnish the necessary care for ESRD patients in the population served.

ESRD patient - A person with irreversible and permanent kidney failure.

ESRD service - Treatment or care (e.g., dialysis, transplantation, supplies) usually rendered to those diagnosed as having ESRD.

Facilities/centers surveyed - Individual facilities/centers completing the annual ESRD Facility Survey form.

Hemodialysis - A method of dialysis in which blood from a patient's body is circulated through an external device or machine and returned to the patient's bloodstream. Such an artificial kidney machine usually is designed to remove fluids and metabolic end products from the blood stream by placing the blood in contact with a semi-permeable membrane which is bathed on the

other side by an appropriate chemical solution referred to as dialysate.

Home patients - Those patients who maintain their own dialysis equipment and/or supplies at home and perform their own treatment alone or with assistance of a helper.

Inpatient care only - A renal dialysis center which performs backup services for dialysis facilities and performs 20 percent or less of its dialysis on an outpatient basis.

Inpatient dialysis - Dialysis which, because of medical necessity, is furnished to an ESRD patient on a temporary inpatient basis in a hospital.

Intermittent peritoneal dialysis (IPD) - A procedure that introduces dialysate into the abdominal cavity to remove waste products through the peritoneum (a membrane which surrounds the intestines and other organs in the abdominal cavity). It functions in a manner similar to that of the artificial semi-permeable membrane in the hemodialysis machine.

In-unit (in-facility) patients - Those patients whose self-dialysis or staff-assisted dialysis is performed in a dialysis unit or facility.

Living-related donor transplant - The surgical procedure of excising a kidney from a living relative of the patient and implanting it in the patient.

Living-unrelated donor transplant - The surgical procedure of excising a kidney from a living person not related to the patient and implanting it in the patient.

Lost to followup (LTFU) - A category of patients whose current status is unknown to the facility which at one time had been dialyzing/following the patient.

Medicare ESRD beneficiary - A person qualifying for Medicare by means of the renal disease provision of the law.

Non-viable kidneys - Cadaver kidneys that are not suitable for transplantation (may be used for research or discarded).

Organ procurement - The process of acquiring donor kidneys.

Organ Procurement Agency (OPA) - An organization which performs or coordinates the performance of all the following services: harvesting of donated kidneys; preservation of donated kidneys; transportation of donated kidneys; and maintenance of a system to locate prospective recipients for harvested organs.

Outpatient dialysis - Dialysis furnished on an outpatient basis at a renal dialysis center or facility. Outpatient dialysis includes staff-assisted dialysis and self-dialysis.

Patients awaiting transplant - Patients who are medically able to receive a transplant, have given consent for a transplant, and are on an active transplant list.

Peritoneal dialysis - See intermittent peritoneal dialysis.

Program Management and Medical Information System (PMMIS) - A computer-based system containing medical and demographic data that deals primarily with current Medicare-eligible ESRD patients but also maintains historical information on persons no longer classified as ESRD patients by reason of death or successful transplantation. In addition, it contains information on ESRD facilities and facility reimbursement.

Provider number - A six-digit number assigned by HCFA for the purposes of identification and billing.

Receiving service - Patients who receive either kidney dialysis or kidney transplant services.

Renal dialysis center - See dialysis center.

Renal dialysis facility - See dialysis facility.

Renal network - See ESRD network.

Renal transplant center - A hospital unit which is approved to furnish transplantation and other medical and surgical specialty services for the care of ESRD transplant patients, including inpatient dialysis furnished directly or under arrangement.

Restarted dialysis - A category of ESRD patients who were on chronic maintenance dialysis, left that treatment category for reasons other than a transplant (e.g., recovered kidney function), then returned to dialysis.

Self-care services - Services provided by a dialysis facility or center to patients who have been trained to perform self-dialysis.

Self-dialysis - Dialysis performed with little or no professional assistance by an ESRD patient who has completed an appropriate course of training.

Self-dialysis patients - Patients who have been trained in dialysis techniques and dialyze themselves in a dialysis facility or at home with little or no professional assistance.

Self-dialysis training and home training - Programs that train ESRD patients to perform self-dialysis in a dialysis facility or at home with little or no professional assistance and train other individuals to assist patients in performing self-dialysis or home dialysis.

Special purpose facility - A renal facility which is approved to furnish dialysis at special locations on a short-term basis to a group of dialysis patients otherwise

unable to obtain treatment in the geographical area. The special locations must be either special rehabilitative (including vacation) locations servicing ESRD patients temporarily residing there, or locations in need of ESRD facilities under emergency circumstances.

Staff-assisted dialysis - Dialysis performed by the staff of the renal dialysis center or facility.

Started for first time ever - A category of ESRD patients who have been newly diagnosed as having ESRD and have been stabilized on dialysis. During the survey period, these patients began their initial course of staff-assisted chronic maintenance dialysis or completed a course of self-dialysis training and began dialyzing at home or self-dialyzing at a facility.

Survey period - The period January 1 through December 31 of each year for which all ESRD facilities must complete a HCFA-2744, ESRD Facility Survey.

Training services - See self-dialysis training and home training.

Transient patients - Patients who are treated by facilities episodically (less than 51 percent of the survey period); e.g., vacationers.

Transplant - The surgical procedure that involves excising an organ from either a cadaver or a living donor and implanting it in the patient.

Transplant center - See renal transplant center.

Transplants performed - The number of kidneys transplanted by donor source type; i.e., living-related, living-unrelated, or cadaveric.

Treatment setting - The type and location of the dialysis treatment being performed; i.e., self-dialysis (in-unit or home), self-dialysis training, or staff-assisted dialysis.

Appendix B

Entitlement provisions

The 1972 Amendments to the Social Security Act extended Medicare coverage to individuals with end stage renal disease beginning July 1973, the month the law became effective. End stage renal disease is that stage of kidney impairment which is irreversible, cannot be controlled by conservative management alone, and requires dialysis or kidney transplantation to maintain life.

As soon as an individual knows that he needs maintenance dialysis treatments, he should apply for Medicare at any social security office. Social Security representatives will help the applicant furnish all necessary information and answer questions he may have about the Medicare program. One of the essential forms to be completed will be a HCFA-2728, Chronic Renal Disease Medical Evidence Report. Notification of entitlement will be mailed later. If a person cannot come to the Social Security office, arrangements can be made so that a representative can visit the person to take an application.

When entitlement to hospital insurance (Part A) is established, the individual is automatically enrolled for supplementary medical insurance (Part B) to begin the same month, unless he specifies he does not want this coverage.

It is not in the best interest of most persons with end stage renal disease to decline Part B coverage because many renal services, such as outpatient dialysis treatments, are covered only under Part B. A person qualifying for Medicare by means of the renal disease provision is eligible for the full range of benefits available under the health insurance program, not just for those services relating to renal care.

Nature of 1978 amendments

The 1978 Amendments to the Social Security Act made a number of changes in the rules governing entitlement to Medicare based on end stage renal disease. The changes were designed to encourage self-dialysis and transplantation and to eliminate a number of inequities and difficulties that existed under previous law. The following changes became effective October 1, 1978:

- *Age 65 restriction removed*—Prior to October 1, 1978, persons 65 years of age or over were ineligible for Medicare based on end stage renal disease. This restriction has been eliminated.
- *Application requirement*—On claims for entitlement October 1, 1978 and later, an application must be filed, with retroactivity limited to no more than 12 months before the month of filing.
- *Early entitlement based on hospitalization for transplant surgery*—Entitlement may begin during a month in the qualifying period if, during that period, the individual

is hospitalized for transplant procedures, and the transplant takes place no later than 2 months thereafter.

- *Waiver of qualifying period based on self-dialysis training*—The qualifying period is waived for persons who during the qualifying period participate in self-dialysis training and are expected to complete the training successfully and self-dialyze thereafter.
- *36 months of post-transplant entitlement*—Entitlement terminates 36 months (rather than 12 months, as under previous law) after the month in which an individual undergoes kidney transplantation.
- *No second qualifying period after termination of R-HI (health insurance based on entitlement because of renal provision of the law)*—An individual whose entitlement to Medicare on the basis of ESRD has ended will be re-entitled as of the month his new course of dialysis begins, subject to the filing of a timely application.

Requirements for eligibility

To qualify for Medicare under the renal provision, a person must have end stage renal disease and either: be entitled to a monthly insurance benefit under title II of the Social Security Act (or an annuity under the Railroad Retirement Act); or be fully or currently insured under Social Security (railroad work may count); or be the spouse or dependent child of a person who meets at least one of these last two requirements. There is no minimum age for eligibility under the renal disease provision. An application for Medicare must be filed (effective October 1, 1978).

When entitlement begins

Provided all eligibility requirements are met, a person's Medicare entitlement based on the renal provision of the law begins with one of four occurrences.

- The third month after the month in which a course of dialysis is initiated. For example, if a course was initiated any time during the month of January, the date of entitlement would be April 1 (Table B-1).
- If earlier, the month a course of maintenance dialysis begins if the individual participates within the waiting period in a self-dialysis training program in an approved facility and is expected to complete the training successfully and self-dialyze thereafter (effective October 1, 1978).
- If earlier, the month of transplant.
- If earlier, the month an individual is admitted to an approved hospital for procedures preliminary to a transplant, if the transplant takes place within the following 2 months. If the transplant is delayed more than 2 months, Medicare coverage will begin the second month prior to the month the actual transplant takes place, or, if earlier, the first day of the third month after maintenance dialysis began (effective October 1, 1978).

Table B-1
Effective date chart for patients applying for ESRD benefits

Regular course of dialysis initiated	Date of entitlement
January	April 1
February	May 1
March	June 1
April	July 1
May	August 1
June	September 1
July	October 1
August	November 1
September	December 1
October	January 1
November	February 1
December	March 1

When entitlement ends

A person's entitlement to this provision terminates with the earliest of the following events:

- The day of death; or
- The last day of the 12th month after a person no longer requires maintenance dialysis treatments; or
- The last day of the 36th month after the month in which the individual receives a kidney transplant. If within 36 months after transplantation the person requires another transplant or returns to dialysis, there is no interruption in entitlement (effective October 1, 1978).

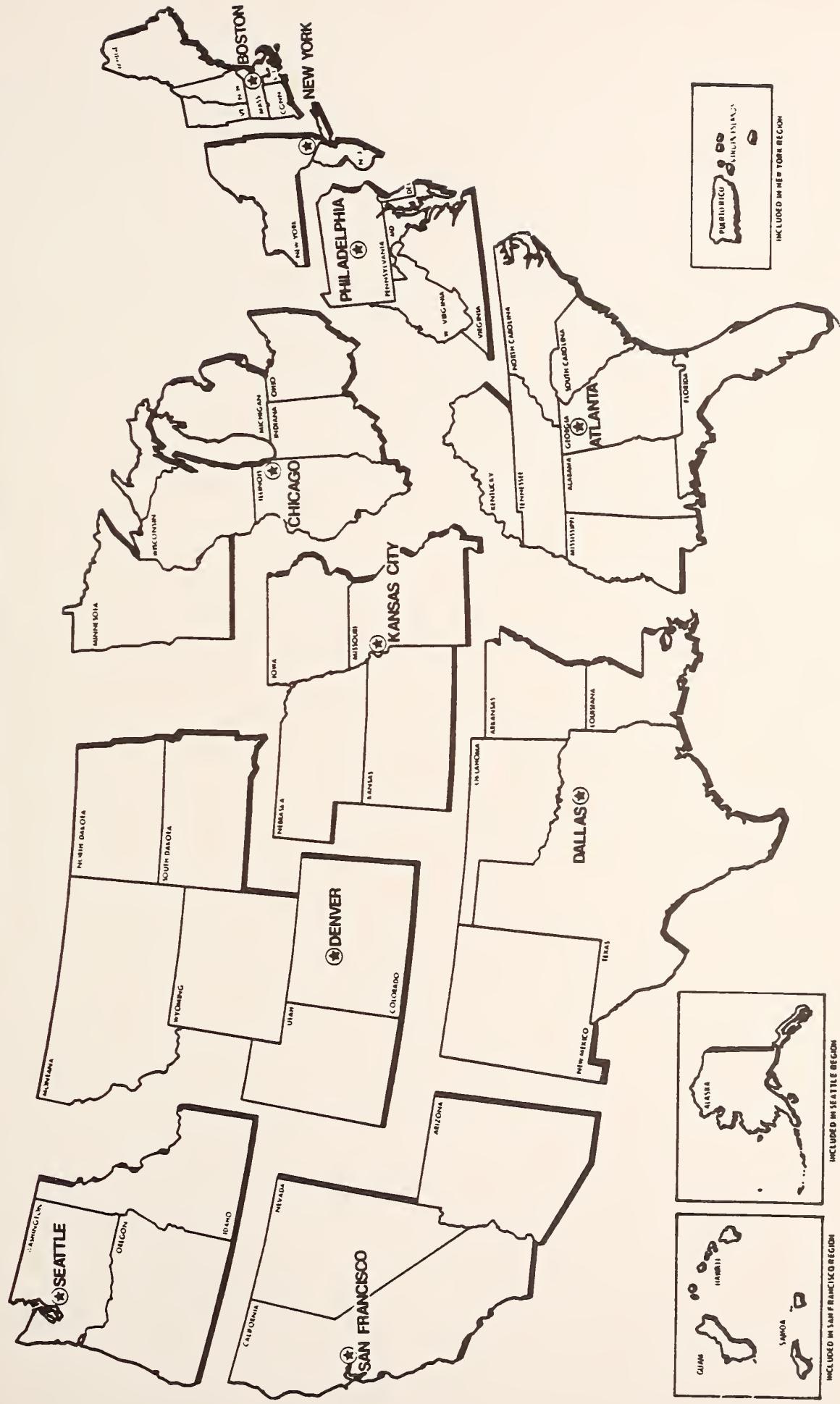
Appendix C

End stage renal disease data sources

Form title and number	Primary purpose	PMMIS function	Research potential
Outpatient Bill (HCFA-1483)	Billing	Dialysis incidence	Prevalence and outcome analyses.
Outpatient Service (UB-2)	Billing	Dialysis incidence	Prevalence and outcome analyses.
Inpatient Bill (HCFA-1453)	Billing	Inpatient stay diagnosis	Morbidity.
Inpatient Service (UB-2)	Billing	Inpatient stay diagnosis	Morbidity.
ESRD Transplant Information (HCFA-2745-U4)	Clinical information	Transplant incidence	Clinical research: Efficacy of treatment, prevalence, and outcome analyses.
ESRD Transplant Follow-up (no number)	Clinical rehabilitative information	Patient and graft survival and rehabilitation	Clinical research: Efficacy of treatment and outcome analysis.
ESRD Death Notification (HCFA-2746)	Death incidence	Death incidence, cause of death	Outcome analyses.
CRD Medical Evidence Report (HCFA-2728-U4)	Entitlement	Identification of primary disease and first date of treatment	Incidence and outcome analyses.
ESRD Facility Survey (HCFA-2744)	Number of Medicare and non-Medicare patients by modality	National overview of Medicare and non-Medicare patients by modality	Incidence, prevalence, and outcome analyses.

NOTES: PMMIS is Program Management and Medical Information System. HCFA is Health Care Financing Administration. CRD is chronic renal disease. UB is uniform bill.

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